

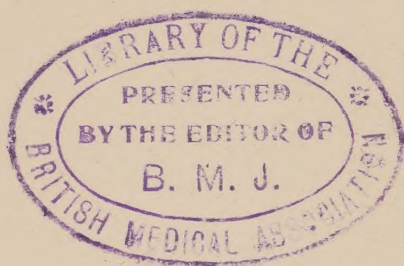
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THE BABY

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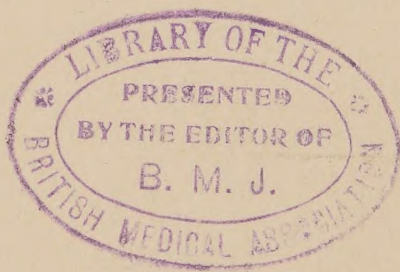
THE BABY

BY

ARTHUR SAUNDERS

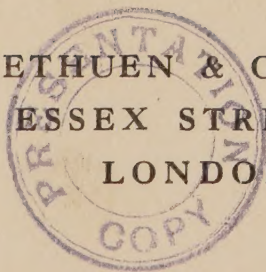
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FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON



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PREFACE

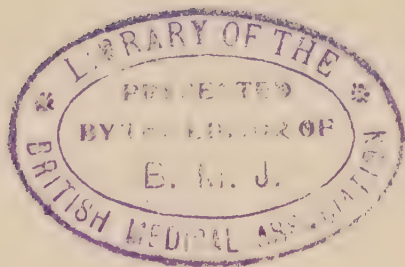
THE health of the race lies in the health of its babies. Healthy mothers have healthy babies born to them, and it is by the loving care of the baby from the moment of birth that its health may be preserved. But neither love nor care can fill the place of knowledge and experience. The right way to deal with the difficulties which threaten a baby's health must be *learnt*, for the promptings of instinct and affection alone are uncertain and vague, but where knowledge and devotion go hand in hand management rests upon a sure foundation. Such knowledge it is the aim of this little book to supply. May it be its good fortune to find its way into the hands of those who have love and care to bestow!

Thrice fortunate indeed is the infant who is

the beloved charge of a healthy and wise mother, for from her he shall derive both sustenance for the body and food for the mind, and his ways being founded in regularity and order and guided with loving watchfulness, he shall have joy in his heart and strength and understanding in his up-growing!

A. S.

October 1917.



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THE BABY

CHAPTER I

THE HEALTHY BABY AT BIRTH

THE HEALTH OF THE MOTHER

IT is the desire of every good mother to have a healthy baby born at its full time and free from all defects. To the health of her baby the care of her own health is essential, and to keep strong and well up to the time of the baby's birth is the best means of transmitting a legacy of health to her offspring.

During the last two months of pregnancy special attention should be paid to the breasts to ensure their fitness for suckling the baby. Daily bathing of the breasts and careful attention to the nipples will help greatly in the avoidance of future trouble when suckling begins.

THE BABY AT BIRTH

GENERAL APPEARANCE.—The colour of the *skin* of a newly born healthy baby is usually of

a bright red hue. This intenser colouring gradually fades in the first two weeks of life, and a slight desquamation or "peeling" of the surface takes place.

The skin of the baby is extremely soft and delicate, and great care must be observed from the first in protecting it from injury (*v.* Care of the Skin, p. 12). Some bruising of the skin about the head and face may be present, but this usually quickly passes off.

The fatty layer which lies immediately beneath the skin is well developed, and gives to the healthy baby its firm and plump appearance, while the greater elasticity of the skin gives to its form a marked smoothness and evenness of contour.

A fine downy *hair* covers the body, while the hair on the head may be well grown from the first, or soft, scanty, and fluffy.

The *nails* are pink and delicate, and reach to the end of the fingers.

The *lips*, *gums*, and *mucous membrane of the mouth* are also of a bright red colour, fading gradually like the colour of the skin in the first fortnight to the rosy hue which persists throughout infancy.

There is little activity of the *sweat glands*, *i.e.* perspiration of the skin, at first, but the *sebaceous glands*, which are connected with the hair follicles, are well developed over both body and scalp.

It is the action of these glands that gives rise to the greasy coating of the skin, which is removed by the first bath.

The *mouth* is usually dry at first, and there is but little secretion of saliva.

An increased tone of the *muscles* is also present, so that they are in the infant firmer, harder, and more resilient than in the later years of childhood.

In wasting illnesses the loss of skin elasticity and muscular tone, resulting in loosely hanging, readily puckering skin, combined with excessive flabbiness of the muscles, is often a marked feature.

EYES AND SIGHT.—The *eyes* at birth are usually of a bluish slate hue. The pupils are small and the movements of the eyes irregular (*v. Growth and Development*, p. 99). Though the pupils react to light, conscious sight is at first probably absent. Some bruising of the eyelids may be present, but this soon passes off. Tears are not secreted in the early weeks, and the blinking movements of the lids, which develop later, are also absent.

EARS AND HEARING—*The Ears*.—Bruising of the ears may also be present, to pass off in the same way as bruising about the eyes or forehead. Hearing is at first absent (*v. Growth and Development*, p. 101).

The other ORGANS OF SENSE are but poorly developed at birth, but the appreciation of

warmth and cold, of roughness or smoothness of touch, and of pain no doubt soon contribute to the baby's feelings of comfort or discomfort.

The senses of smell and taste are present shortly after birth.

The BREASTS both in boys and girls are often well developed at birth, and a small amount of mammary secretion is present. This may be somewhat increased for a few days after birth. The breasts should not be squeezed or the secretion pressed out. The slight swelling disappears in a few days. It is probably connected with the general congestion of the surface of the body.

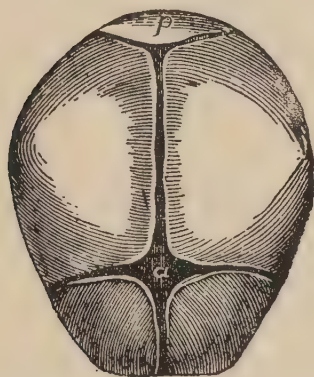


FIG. 1.—Baby's Skull at birth from above

a. Anterior fontanelle
p. Posterior fontanelle

The BONES at birth are soft and are largely cartilaginous in structure. Gradually lime-salts become deposited in the

cartilage, and the bones become firm and hard. These lime-salts are derived from the milk of the mother.

The BONES OF THE SKULL (Fig. 1) at birth are not completely united, and towards the front of the head an open space is left between them—the *anterior fontanelle*. Towards the back of the head a smaller open space, the *posterior fontanelle*, also exists, which usually becomes closed about

the time of or shortly after birth. Owing to the bones of the skull not being joined up, a certain amount of moulding of the skull may take place at birth by the overriding of the edges of the bones along the *sutures* or lines of division between the bones, and after birth there may be some change in the shape of the skull from a restoration of the bones to their original position. This usually takes place in a few days, or at most within a fortnight. A swelling of the surface of the scalp, or more rarely of the face, is sometimes present at birth from pressure during labour, but this as a rule passes off in a few days.

The **JAWS** at birth are small and undeveloped, causing the lower portion of the face to be small in comparison with the upper.

The *teeth* are already formed in the jaw at birth, lying hidden in the gums. In rare cases one or more of the front teeth may be "cut" before birth.

The action of the *heart* at birth is rapid. When the baby is quiet, the *pulse*, which is often readily visible over the site of the anterior fontanelle, varies from 120 to 140.

The *respiration* of the baby is often irregular, and is subject to considerable variation. At one time it may be very rapid, while at another it may become so shallow as to appear to cease almost entirely. The rate of breathing at birth is usually about 30 to 40 per minute.

The act of breathing is of the "abdominal" type, being largely dependent upon the descent of the diaphragm, the large muscle separating the chest, which contains the heart and lungs, from the abdomen, which contains the organs of digestion.

The normal *temperature* of the baby is a varying one, between 98° F. and 99° F. It is most conveniently and most accurately taken in the rectum. A baby should have its special thermometer kept for itself alone (Fig. 2).

The *bowels* are usually open in a few hours after birth. The first *stools* consist of a dark greenish brown substance termed meconium, which is practically odourless and of a sticky semi-solid consistence.

In a few days the stools become more fluid and yellow in colour.

Urine is often passed soon after birth, and is clear and of a light yellow colour. In the first few days but little is passed, but with the establishment of the secretion of the mother's milk, it becomes increased in amount and is passed at frequent intervals.

The UMBILICAL CORD (*v.* Care of the Cord, p. 15) gradually dries up and "falls off" about the fourth or fifth day, or a little later.



FIG. 2.—
Clinical
Thermo-
meter

The *weight* of the baby at birth should be about 7 or 8 lb., though perfectly healthy babies may weigh considerably below this—5 to 6 lb., or considerably above—up to 12 lb. Boys are on the average some 6 to 8 oz. heavier than girls.

The *length* of the baby at birth should be about $19\frac{1}{2}$ or 20 in. Boys are on the average about half an inch longer than girls.

CHAPTER II

THE CARE OF THE NEW-BORN BABY

THE WANTS OF THE NEW-BORN BABY

THE immediate wants of the new-born baby are primarily *fresh air* to breathe and *warmth* sufficient to maintain the temperature of its body. For the preservation of this bodily heat the need arises for *coverings* or *clothes*.

To these requirements is soon added that of *food*, and with the giving of food in the proper manner and at the proper intervals, the *training* and education of the child at once begin. *Light and sunshine*, moreover, are required for its proper growth and development.

The early movements of the baby's limbs attest its need for *exercise*, and its wakeful hours alternate with periods of *rest* and *sleep*, which are needed for recuperation.

Extreme *cleanliness* of the body and its surroundings are essential to health, and in the due *regulation of its habits* commences the foundation of its character.

FRESH AIR.—One of the first acts of the new-

born babe is to lay claim by the intake of *air* to one great essential of its existence, and with the same breath with which it first fills its lungs it proclaims aloud its arrival with a cry.

And let it be the care of those who prepare for the infant that such air shall be sweet and fresh, not exhausted and vitiated by the breath of those who wait to welcome its arrival, nor by the burning of lamps or gas, for none shall enter more deeply into its being nor has a greater work to perform.

IMMEDIATE ATTENTION AT BIRTH.—At the birth of the baby the eyes are usually cleaned at once with dilute boracic lotion, or, as a further precaution against possible infection, with a lotion of some silver salt, and it is then handed over to the nurse to be wrapped in a soft warm flannel blanket and placed in comfortable surroundings, out of draughts, in a warm well-ventilated room.

LATER ATTENTION.—When the nurse is free to attend to the baby, her first care is to wash and dress it. As a preliminary to the first bath the anointing of the skin with cold cream or olive-oil is helpful in removing the greasy matter with which it is covered.

It is on the occasion of the first bath that minor physical defects when present are often first detected.

HANDLING.—A baby must be handled always lovingly and tenderly, and with the greatest care. It must not be subjected to rough and rapid

movements, or shaken or danced about, but be carried slowly and quietly from place to place, its position changed gently and smoothly, while its skin must be protected from all rough and irregular surfaces, from extremes of heat and cold, and from all painful or uncomfortable impressions.

Gentle handling of a baby is, however, beneficial, and with the stimulation thereby imparted to the skin are associated muscular movements, increased activity of circulation, and pleasurable sensations, all of which contribute to the baby's well-being. In lifting the baby up special care must be taken to support its head during the early months (cf. p. 105). All those who come near the baby should also move slowly and quietly, and no sudden movements of any kind should be permitted in its close neighbourhood.

THE FIRST BATH.—The bathing of the baby should be conducted in a warm room at a temperature of about 65° F., usually before the fire, when this is the method of heating, and screened from draughts. The most convenient position for the nurse is for her to be seated on a chair in front of the bath, which is supported on another chair or otherwise raised to a convenient height. The temperature of the water should be 100° F., and should be determined by means of a bath thermometer (Fig. 3).

A fitted baby's basket should be within comfortable reach.

The bath should be of a convenient size, so that the baby can be lowered into it while supported on the left hand and forearm of the nurse, her right arm being employed in washing the child.

The Eyes.—The baby still being wrapped in flannel, the eyes should first be cleaned by gently sponging with a small piece of absorbent wool dipped in weak boracic lotion. A separate piece should be used for each eye and immediately burnt or thrown away. Any inflammation of the eyes on the second or third day should be reported to the doctor immediately.

Washing.—The baby should be rapidly washed all over with soap and water, a small amount of soap only and a soft flannel being used, and should then be thoroughly sponged over.

The head should be sponged over, but not immersed in the water, and care should be taken to prevent water entering the ears.

The bath must be kept scrupulously clean, and must not be used for any other purpose than that of washing the baby.

Drying.—The drying should be carried out by means of gentle, firm pressing, rather than rubbing movements, with a clean, dry, warm, and soft towel, the baby being lifted out of the bath and



FIG. 3. —
Bath Thermometer

immediately placed on its back on a warm towel on its nurse's lap. It is better to have two warmed towels, one on which to place the baby, and the other for the purpose of drying.

After the baby has been dried in front, it is gently turned over so as to lie face downwards, and its drying completed. Friction with the towel must be avoided. Especial care must be devoted to the removal of the moisture from the flexures of the arms and groins. Unless the skin shows signs of irritation, powdering is unnecessary (*v. Care of the Skin*, p. 13). The eyes, ears, and lips must be dried thoroughly and very gently.

CARE OF THE SKIN—*Cleanliness*.—The skin of a baby is extremely fine and delicate, and easily injured. Great care must be taken from the first to avoid its being damaged by rough or irritating clothing, by crude or alkaline soaps, or by the use of napkins which have been imperfectly or improperly washed. The presence of soda in washed napkins is a frequent cause of sore buttocks.

Cleanliness and the keeping of the skin dry is all-important. Special care is needed for the skin about the buttocks and genital organs, which is liable to be moistened and irritated by the discharges from the bowel and bladder.

The diaper should be changed as soon as it is wetted or soiled.

The skin should then be carefully cleansed by

sponging with warm water and then dried. If carefully dried powdering of the skin is unnecessary. If at all irritated it should be powdered with a fine powder, consisting of equal parts of zinc oxide, boracic acid, and starch.

In female children the genital organs should be cleaned by gentle wiping from before backwards with pieces of absorbent wool dipped in boracic acid lotion, each piece being thrown away after use.

If the child has perspired much, the skin should also be sponged and dried, special care being taken with regard to the folds of skin, where opposing surfaces come into contact.

Soap.—Very little soap is required in the washing of the baby. It is important that it should be pure, and contain no excess of alkali. “Superfatted” soaps are the most suitable.

Hard Water.—When the water used for washing is very hard, *i.e.* contains much lime-salts, the skin becomes dry and rough. The skins of some infants are especially easily damaged by hard water.

Hard water can be softened to a certain extent by the addition of water softeners or by boiling, but the use of rain-water, where this is obtainable, is much to be preferred.

If the skin becomes red or rough from any of these causes, a little vaseline or cold cream applied two or three times a day will often aid in protecting the surface from further injury, and have a

healing influence. In severer cases the advice of a doctor should be sought.

CARE OF HAIR, NAILS, EARS, AND MOUTH—*The Hair*.—The hair of the head should be sponged over when the baby is bathed (v. p. 11). Often in the early weeks of life the secretion of the sebaceous glands in connexion with the hairs tends to accumulate upon the surface of the scalp, and to form a yellowish brown adherent crust over the forepart of the head.

This should be soaked in olive-oil, and is then easily removable by gentle washing with soap and water.

The *nails* should be kept perfectly clean, and should be trimmed as they grow.

The *ears* should be washed gently and carefully with soap and water, but should not be pinched or dragged upon in the process. Water should not be allowed to enter the inner ear, and, after washing, all water about the external ear should be dried up by means of absorbent wool.

Neither in infancy nor in later life should the inner ear be cleaned by screwing up the corner of a towel and inserting it into the ear. This is not only liable to cause “balling” of the natural secretion of the ear, with blocking of the passage and consequent deafness and other troubles, but may lead to great irritation or very troublesome eczema of the delicate lining membrane.

THE MOUTH.—*The mouth of a healthy baby*

cleanses itself, and should not be wiped out either as part of the daily toilet or after food has been taken.

The saliva, though at first scanty, provides a constant supply of moisture within the mouth, which by the active movements of the tongue, lips, and jaws is distributed over the whole of its inner surface, so as to keep it continually bathed and cleansed with its own natural secretion, for which any mouth wash, however carefully prepared, can only offer but a feeble substitute.

The delicate lining membrane of a baby's mouth is even more easily damaged than the skin, and wiping out the mouth often results in the production of minute abrasions, which are liable to become the site of infective processes.

In the mouth, which is warm and moist, germs are readily able to flourish if they obtain a footing on the surface of the mucous membrane by the removal of the delicate, protective, epithelial layer.

The preservation of this layer in an undamaged condition is therefore most important.

CARE OF THE CORD.—The treatment of the cord is directed to keeping it dry and free from the possibility of infection. After the bath it is a wise precaution to further cleanse the cord with a piece of absorbent wool dipped in boracic acid lotion. After careful drying the cord should then be thoroughly well powdered with the same

drying and antiseptic powder as is used for the skin when irritated, namely, one consisting of equal parts of starch, boracic acid, and oxide of zinc.

The best dressing for the cord is one of soft sterilized absorbent gauze. If this is not obtainable any clean soft linen or cotton material may be used, which has been rendered sterile (*i.e.* free from all germs) by recent boiling and drying and subsequent protection from possible contamination.

The dressing should be well powdered and completely wrapped around the cord, which must also be well covered with powder, especially at its base and tip. The cord, surrounded by its dressing, is then turned upwards upon the abdomen, and is kept in position by the binder, on which, together with the vest and flannel petticoat, the baby is laid when it is turned over after drying (*v. p.* 17).

The cord usually separates from four to ten days after birth, leaving a raw surface at the point of its attachment, which is termed the Navel or Umbilicus. This should be cleaned with a little boracic lotion, carefully dried with sterile absorbent wool, well powdered, and kept covered with a 2½-in. square of well-powdered absorbent gauze (*cf. pp.* 18–19).

Bleeding from the Cord.—Should any bleeding take place from the cord, the doctor should be sent

for at once. This is not a common danger, but if it occurs it should receive immediate attention.

Inflammation of the Navel.—Should the skin about the navel become inflamed either before or after the cord has separated, the doctor should also be informed at once.

THE FIRST DRESSING.—A baby's clothes are primarily to prevent the loss of heat from the skin (*v. Clothing*, p. 35).

After the baby has been dried, and while still lying on its stomach, the most convenient and least tiring method of dressing is to place the binder, vest, and flannel petticoat upon its back and then turn it gently over upon these garments while the cord is dressed.

The dressing of the cord should be at once fixed by the binder, which is brought round the abdomen and stitched in position firmly, but not too tightly.

The vest, which should open in front, is then fastened. If the vest does not open and has to be put on over the head or pulled up over the legs, the process of dressing is unnecessarily lengthened. Such a vest also admits of less adjustment, and, as the child grows, soon becomes too tight.

The diaper is then placed in position, and its point brought up between the legs and made secure.

The flannel petticoat, which also opens in front,

is folded over the chest, and its lower end, being doubled up over the feet, is fastened in position.

The frock may be pulled up from below.

The baby should now be gently laid in a warmed cot and left undisturbed, when it usually goes off to sleep.

It should be accustomed to being put off to sleep from the first without the need of rocking or nursing. It should be put to the mother's breast after both baby and mother have had some sleep. This will usually be several hours after birth. It should in any case be put to the breast within the first twelve hours.

The Binder.—The simplest form of binder consists of a strip of fine flannel some 5 in. wide and 18 in. in length. The baby being laid on its back on the binder, the two ends should be brought forward and overlapped, the outer end being then stitched in position so that the binder fits round the abdomen firmly, but not too tightly.

After the cord has separated, and until the wound has healed, it should be applied so as to bring together rather than pull apart the edges of the navel. This can be done by gently pressing together the edges of the navel when the binder is overlapped in position.

The use of the binder is to retain the dressing of the cord and navel in proper position and to keep it dry and aseptic. It also acts as a belt

to keep the abdomen warm. If applied too tightly the compression tends by limiting the descent of the diaphragm to interfere with the powers of breathing, and, by restricting the proper expansion of the abdomen after the taking of food or in the acts of crying, sneezing, or coughing, aids in the production of "rupture," while its continued use so hampers the action of all the abdominal muscles as to prevent their proper development.

It should, therefore, be worn only until the raw surface left at the site of attachment of the cord is healed. This should be at the end of ten days or a fortnight, and its place should then be taken by a Shetland wool or knitted woollen belt.

The Diaper or Napkin.—This consists of a triangular-shaped bandage, two ends of which are brought round the waist, while the third is brought forward between the legs and secured to the first two, preferably by means of tapes.

Fastening by safety-pins, though convenient, is open to the objection that the skin of the baby may be pricked or even pierced in the process.

The napkin is used to protect the baby's clothing from becoming soiled, and as a means of quickly removing the discharges of the bowel and bladder from the baby's skin. It also aids in keeping warm the lower part of the body.

If applied too tightly or carried too far down the legs, or if the portion carried forward between

the legs is too lumpy or bulky, freedom of movement and proper muscular development is interfered with, while so much strain may be placed upon the legs as to result in actual deformity. Napkins should be made of some warm, soft, non-irritating, absorbent washable material. The triangular form is the best. If square napkins are folded so as to form a triangle, a less bulky fold may be produced by bringing up the inner portion only between the legs, while the outer portion is allowed to hang loose. Detachable pads may be used, made of absorbent wool or gauze, wood wool, or sterilized sphagnum moss, and when soiled can be thrown away or burnt.

Wet or soiled napkins should be changed at once. They should be taken from the baby's room, rinsed at once, and left to soak in cold, and if possible soft, water. The hands should then be thoroughly washed. All soiled napkins should be washed, boiled, dried, and aired before being again used. New napkins should also be boiled, dried, and aired before use, as this renders them softer and less liable to irritate the skin.

When a pad is used it may be occasionally only necessary to change this, but if the napkin is at all damp or soiled a *clean* one should be used at each changing. A napkin should never be dried and used again before being washed.

The skin of the baby should receive attention at the time of changing, being thoroughly cleaned

with warm water, and carefully dried before the application of the fresh napkin.

If wet or soiled napkins are left in contact with the body the skin soon becomes red and rough, or actual sores may be produced, while continued neglect may result in severe infections of the skin surface or, especially in the female infant, of the genital passages.

The chilliness, too, produced by a wet napkin is a danger to the baby, which will often call attention to its discomfort by crying when the napkin is damp or soiled.

Mackintosh should not be used outside the napkin, for it prevents the proper ventilation of the skin, so that the products of perspiration tend to collect on its surface, and lead to irritative or inflammatory changes.

Even on a long journey an opportunity can usually be found for changing the napkin when necessary.

CHAPTER III

THE BABY'S SURROUNDINGS

AIR AND SUNSHINE

A SUPPLY of fresh air both by day and night is one of the first necessities of health. When the weather is suitable, a baby should be kept in the open air as much as possible, and even in cold and inclement weather, where more time may have to be spent within doors, a free supply of pure air should always be kept up in the room by a proper arrangement of ventilation (*v. Ventilation*, p. 25).

A baby's room must be kept clean and free from dust and odours, and while the air both day and night is kept sweet and fresh, the baby must be protected from draughts.

In addition to pure air, daylight and sunshine directly aid in the formation of blood, and act as a stimulus to the vital processes. Babies who live in fresh air are firmer, livelier, and of a better colour, and, while more cheerful and energetic when awake, sleep soundly and uninterruptedly at night and when put to rest during the day.

The head and eyes of babies should be shaded from direct sunlight and from bright or glaring lights.

WARMTH

Babies of all ages require to be kept warm. In proportion to their size, the amount of surface is large, and it is through the skin which covers this surface that heat is lost.

The temperature of the rooms which they inhabit requires, therefore, to be kept warm, and their clothing and coverings to be formed of warm material.

Hot-water bottles (Fig. 4) are of value as an additional means of providing heat in the immediate surroundings of the baby, as for warming the bed, especially in the case of illness or of weak or delicate infants.

Great care must be taken that the bottle is separated from the baby by several folds of blanket, and it should be placed in such a position, and at such a distance, that in no possible way can it come even then in close contact with the child.

Severe burns may be the result of neglect of such precautions.

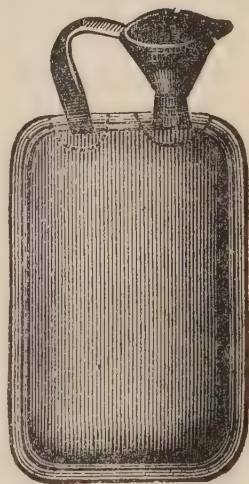


FIG. 4.—Hot-water Bottle

THE NURSERY

(a) LIGHT AND SUNSHINE.—Two rooms—the day and night nursery—should be set apart for the baby if this be possible.

The day nursery should be a sunny room, having in the temperate regions of the northern hemisphere a south or south-western aspect, so that it receives plenty of direct sunshine through the greater part of the day. It is the child's "living-room," and should be a clean, bright, and happy spot in the home.

The situation of the room must depend on the size and structure of the house. A room towards the top of the house is often lighter, quieter, and more airy, but a room in a wing where this exists is often more suitable, being quieter, and less liable to be disturbed by general household activities. It should be of a good size and have a cheerful outlook from the windows.

The *windows* of both day and night nursery should be large, guarded by bars, and capable of being thrown widely open.

The *floor* must be washable. The most suitable covering is one of cork linoleum, which is warm, durable, easily cleaned, and not too slippery.

The *walls* should be light in colour, and have a smooth, non-absorbent, washable surface.

Many kinds of paints forming such a surface are now obtainable, as well as various forms of washable wall-papers.

Pictures and hangings of all kinds tend to harbour dust, and should be but few. The pictures should be of bright colouring, dealing with simple and happy subjects.

(b) FRESH AIR — *Ventilation*. — A constant supply of fresh air is most important for health. This is obtainable in the hot weather of summer by keeping the windows widely open, the room at the same time being kept cool in the heat of the day by the drawing of blinds or sun-blinds when necessary. In less hot weather proper ventilation, *i.e.* the keeping of the air fresh, may be maintained by the window, or windows, being kept slightly open, preferably at both top and bottom, or where French windows are present by opening them to a slighter extent.

In cold weather, when a constant supply of fresh air is difficult to maintain, the room may be more fully aired two or three times a day, either when the child is taken out of doors or when removed for a time into another room. It may be necessary to warm the room after such an airing before the child is brought back into it again.

The maintenance of efficient ventilation, and at the same time of a proper degree of tempera-

ture, constitutes often a practical problem of great difficulty. In order to keep the air fresh without lowering the temperature to an uncomfortable or dangerous degree, artificial means of heating become in cold weather a matter of necessity, and even with their aid it may be difficult to keep the room properly warm. *Fresh air must not be sacrificed to warmth*, and increased or additional means of heating must be obtained if necessary (cf. p. 28).

The drainage of the house must of course be beyond reproach. *Any escape of sewer gas into the house constitutes a serious menace to health.*

(c) HEATING.—An open fire, preferably in a sunk grate, forms one of the best means of heating. It warms the room and at the same time promotes ventilation by the constant passage of air up the chimney. During the early years it is a perpetual source of pleasure and interest, and in the winter evenings throws so warm and cheerful a glow over the proceedings of washing and undressing that these render bedtime a happy ending to the day, and often remain a treasured memory through after years. The fire should be guarded by a fender some 4 ft. high.

A thermometer (Fig. 5) should hang on the wall to indicate the temperature of the room, which should be kept at 60° to 65°. Premature or delicate children may require a temperature

of 65° to 70° F. At the age of six months the temperature may be reduced to 55° to 60° F.

Draughts must be guarded against.—Draughts are especially liable to occur between window and fire-place and to steal along the floor from door to fire-place. A screen should be placed at the door to prevent direct draught from this direction, and a further screen is often useful in protecting from draughts the portion of room in which the child is placed. Extremes and sudden changes of temperature are to be avoided, and a watchful eye should be kept upon the condition and appearance of the baby's skin. A baby that is too hot may show it by becoming flushed in the face, though this is not always the case, as it may be pale, but it will almost invariably become moist about the lips or head, beads of perspiration standing out upon the surface of the skin, or the hair becoming wet and clammy.

A baby that is too cold becomes pale or bluish about the face; the lips, hands, and feet are blue and cold to the touch, while the limbs may show a blue mottling of the veins.

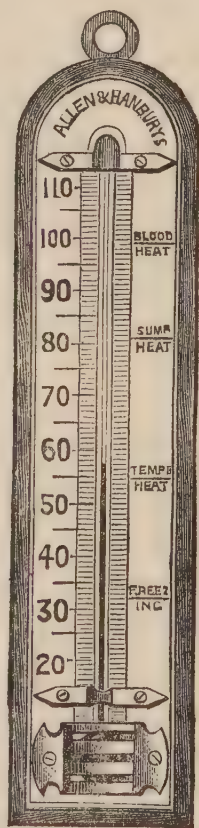


FIG. 5.—Room Thermometer

The *night nursery* should also be kept well warmed and ventilated.

In cold climates or cold weather a fire will be required, and also, possibly, additional means of heating. Here the hot-water bottle may be a necessity. In houses fitted with electricity, portable electric radiators are a most useful source of heat, and may be put under the window to warm the air which comes in contact with the cold panes of glass, or placed elsewhere in the room.

Lamps which consume the air or gas stoves without a proper chimney to carry away all products of combustion are quite unsuitable as a means of heating.

Gas stoves or gas fires, indeed, though useful for the supply of heat, are not to be recommended. They tend to dry the air to excess, even if a bowl of water is placed in their neighbourhood, as is the custom, to supply moisture to the air by means of evaporation. The jets and taps, moreover, are liable to leak, and when the fire is turned out, the unburnt gas which is retained in the pipes beyond the tap gradually diffuses into the room.

(d) LIGHTING.—Properly shaded electric lights are the best means of lighting the nursery. Gas and lamps are both unsuitable as they consume the air of the room. Candles consume less air, and in the absence of electric light are to be

preferred. They must be carefully trimmed if burning improperly, and should be so extinguished as not to smoulder.

In the night nursery a night-light consumes but little air, and is of use in providing a glimmer of light throughout the night.

(e) CLEANLINESS.—Extreme *cleanliness* must be observed in both day and night nursery of floor, walls, and furniture. No food should be kept in the nursery itself, and all slops or soiled clothes should be taken away at once.

The bedding and bedclothes must be thoroughly aired each morning in the open air or at an open window, or on wet days before a fire. Any blankets or bedclothing or articles of wearing apparel that have been wetted or soiled must be thoroughly washed, dried, and aired before being again used.

THE CRADLE OR COT

A baby from the first should not be in bed with its mother, but should have its own bed. Cots even for delicate infants are much to be preferred to cradles or bassinets.

Of cradles, unlined open wicker-work cradles are the best, allowing free ventilation at the sides, and to these there is but little objection.

Any arrangement, however, which interferes with the free access of fresh air or with the escape

of the warm, impure air of the breath is to be avoided.

The baby should not therefore be surrounded by the sides of its cradle, so that it lies in a pit or well, but should have a bed which resembles that of the adult in miniature, except that it is provided with barred or latticed sides to prevent the baby rolling out.

For the same reason the cradle should not be lined nor provided with curtains or a canopy, nor closed in or covered over with a veil or fine netting.

The head should be kept comparatively cool, and though there should be a free flow of air through the room, the cradle should be screened from direct draughts. In hot weather or tropical climates a slight movement of the air about the cradle itself is, however, both refreshing and beneficial.

If a cradle be used, it should not be placed upon the floor, but raised on legs or supported on a low table or wide bench or on two chairs. It should be fixed, and not made for rocking or swinging.

After the ninth or tenth month, when a child begins to be able to pull itself up, the cradle should be exchanged for a cot with high-barred sides.

An enamelled iron cot raised on legs, with a wire mattress and with sides that can be lowered

for attention to the child and for making of the bed, is by far the most convenient.

Making the Bed.—Upon the wire mattress of the cot should be placed a horsehair mattress, and on this should be laid a mackintosh or rubber sheet, and on top again a layer of blanket.

On this the baby should be laid, either enveloped in a blanket or covered over with warm, soft blankets, and, if necessary, a light eider-down quilt. Its head should be supported on a soft, linen-covered pillow. When the child begins to grow up, a board can be suspended by iron supports from the top rail of the sides of the cot to form a table for the support of food-utensils, toys, etc. A net may be stretched over the top of the cot to prevent a child clambering up and falling out, as severe injuries may thus be sustained.

BATHING

Bathing at first should be rapidly carried out, occupying but a minute or so, but, after the first fortnight, the time may be gradually lengthened to three or four minutes, as long as the temperature of the water and surroundings is well maintained. For the first few weeks but one bath should be given daily, preferably in the morning, the baby being sponged over only at bedtime, but after this, in strong and healthy

children, a bath should be given both morning and evening.

For delicate children one bath a day is often to be preferred, while for the very weakly, or those who become pale in the face or blue and cold about the mouth, lips, or extremities, gentle sponging only is desirable.

Though the temperature of the first bath should be 100° F., this may be quickly reduced in the first week to 95° F. At the end of two months the morning bath may be still further reduced to 90° F., and at the end of six months to 85° F. to 80° F. The evening bath may remain at 95° F.

Towards the end of the third month it is a good plan to finish the bath by sponging with water a little cooler than that of the bath, and the temperature of the water used for this sponging may be gradually lowered, until, at the tenth month or end of the first year, water at 60° F. or 65° F. may be thus used after the morning bath. When the child is able to stand, the sponging should be conducted while the child stands in the bath.

At no time should the sponging with cooler water produce blueness or coldness. Quite cold baths or cold spongings are not suitable for young babies. As a general rule, the bath should be given slightly warmer during cold weather, and advantage may be taken of the

advent of warm weather to introduce a lowering of the bath temperature, if desired.

The whole process of undressing, bathing, drying, and dressing must be conducted rapidly, all arrangements being first made and everything that may be wanted placed close at hand, so that the baby may not run the risk of unnecessary exposure and loss of heat. The bath, chairs, and screen must be placed in convenient position, hot and cold water must be got ready, and dry and warm towels must be at hand. The soap, flannel, and sponge, the baby's basket with all its fittings, and the baby's clothing must all be within convenient reach.

It is often a wise precaution to shut the window while the child is being given its bath, though in warm weather, and when draughts are completely excluded, this may be unnecessary.

The temperature of the room should be about 60° F.

At the end of the first year the morning bath may be reduced to a rapid sponging with warm, followed by cold, water, and a rub afterwards with a Turkish towel.

In the evening a warm bath of 95° F. to 100° F. may still be given, followed by cold sponging and a rub down.

The Hot Bath.—Hot baths of a temperature of from 100° F. to 104° F., if given rapidly—for only five or ten minutes at longest—even in

older children, are stimulating and often of great benefit.

At the end of a long journey or any long or exhausting day such a bath, followed by rapid, cooler sponging, exerts an effect upon the tired child which is little short of marvellous in banishing fatigue and restoring its sense of well-being.

At the beginning of acute illnesses, often attended by chilliness or collapse, such a bath is also invaluable, the child being placed immediately afterwards, without cold sponging, in a warm bed.

The same treatment is also of great use in the treatment of convulsions.

The higher temperatures, 103° F. to 104° F., should not be used for delicate babies, and in all cases the skin should be at first sponged with the hot water before the child is lowered into the bath.

Temperatures of Baths.—The following names are applied to baths of varying temperatures :—

Cold Bath . . . 34° F. to 65° F.

(Temperatures below 60° F. are not suitable even for older children in good health.)

Cool Bath . . . 65° F. to 75° F.

Temperate Bath . . . 75° F. to 85° F.

Tepid Bath . . . 85° F. to 95° F.

Warm Bath . . . 95° F. to 100° F.

Hot Bath . . . 100° F. to 106° F.

In cases of illness the temperature and dura-

tion of the bath are frequently ordered by the doctor.

CLOTHING.—A baby's clothes are primarily to prevent the loss of heat from the skin. They should be made of soft, light, and warm material, and the garments themselves should be few and simple.

They should be elastic enough to fit well, and yet loose enough to allow of free movement of the limbs, chest, and abdomen. Soft wool or fine flannel is the best material for under garments.

They should be secured as far as possible with tapes or soft buttons rather than safety-pins. Unprotected pins should never be used.

Great care should be taken also by those handling the baby that they have on them no unprotected pin, brooch-fastening, or ornament by which the baby might possibly be injured.

Tight strings or bands are especially to be guarded against, for they may seriously impede the full expansion of the chest or exercise injurious pressure upon the contents of the abdomen, especially during the process of digestion.

After the end of a fortnight the binder should give way to a soft knitted belt, which may be pulled on from below.

The amount of clothing should only be sufficient to keep the skin comfortably warm. If the baby perspires much, some clothing should be removed.

CHAPTER IV

NATURAL FEEDING

ADVANTAGE TO BOTH MOTHER AND CHILD

IF the mother is healthy and has plenty of milk, her own breast milk alone should be given until the baby is eight months old.

The mother's milk is a wonderful and perfect food which owes its very existence to that of the baby, and is destined by nature to constitute a further part of its being. On breast feeding depends the health of both mother and infant.

In the satisfaction of administering to the wants of her tiny and dependent offspring, a mother finds one of her deepest sources of pleasure, and at the same time contributes largely to the restoration of her own health.

From its mother the baby receives a food, ready warmed, pure, fresh, and germ-free, especially adapted to its own individual needs—the complement, as it were, of itself—and changing in strength and quantity with its growth and digestive powers.

Breast feeding is indeed at once a mother's

privilege and a baby's birthright. Nothing, not even the most carefully prepared "humanized milk" or the milk of a "wet nurse," can really replace for a baby the milk of its own mother, and anyone who persuades or encourages a mother to give up suckling her baby before the ninth month, incurs a heavy responsibility as to its future health.

It should be discontinued before this time only on medical advice, after a careful investigation of all the facts in connection with the case.

THE FIRST FEED.—The baby should be put to the breast for the first time between six and twelve hours after birth. It is wise to allow several hours to elapse so that the mother may obtain rest and sleep and such nourishment as may be desirable.

The baby after birth should be kept warm, but does not require food for many hours, and even if placed at the breast obtains at first but little nourishment.

Still, the small amount of nourishment thus obtained is of great importance to its well-being.

By placing the baby to the breast the secretion of milk is also stimulated, the powers of sucking are exercised, and training is begun in regularity of habits.

COLOSTRUM.—The fluid that is secreted by the breasts for the first two or three days is of a

much more watery character than milk, and is termed "colostrum." It is scanty in amount, especially in mothers with their first baby, and is slightly laxative in character. If the baby is put to the breast too often at first, this may act as too powerful a purgative and cause diarrhœa. During the first twenty-four hours the baby should be put to the breast at eight-hourly intervals, and during the second day at intervals of four hours during the daytime.

The baby should not be given any artificial purgative, such as castor-oil or butter and sugar, as is a common practice. Nor does it require artificial food, such as sweetened whey or diluted milk, in the first few days before the natural flow of milk begins.

Many babies are artificially fed quite unnecessarily on the second day of life. In very hot weather or in tropical climates a little pure cold water may be given to satisfy thirst, but that is all that is required.

During the third day the secretion of milk begins, and the baby should then be fed at three-hourly intervals during the day.

As the action of the breasts becomes established, the healthy baby who has not been fed on butter and sugar, sweetened whey, or other dainties soon obtains, by its vigorous sucking, a sufficient supply of milk.

HOURS OF FEEDING.—The feedings should not

exceed six times in the twenty-four hours. It is not necessary to feed at night.

REGULARITY OF HOURS OF FEEDING.—*From the first strict regularity in the hours of feeding should be observed.* The following hours are usually convenient :—

6 a.m. 9 a.m. 12 noon. 3 p.m. 6 p.m. 10 p.m.

The baby should be waked for feeding at the appointed hour. Regular hours of feeding, with a long interval at night, provide the necessary rest for both mother and baby. Too frequent feeding leads to a too constant stimulation of the baby's digestive powers, and so to gastric irritation. The giving of a little milk between feeds "to keep the baby quiet" is an inadmissible practice.

The breasts of the mother also require intervals of rest, for if the breasts are too frequently stimulated, the milk begins to deteriorate in quality, and the nipples are apt to become sore and painful.

At the beginning of the fifth month the baby should be fed only five times a day, the intervals between the times of feeding being increased to four hours.

The following hours are then convenient :—

6 a.m. 10 a.m. 2 p.m. 6 p.m. 10 p.m.

POSITION OF MOTHER.—The mother at first should give the baby the breast while lying down in a comfortable position in bed, her head and shoulders being slightly raised with pillows,

her body slightly turned towards the side on which the infant is to be fed, and her elbow on this side supported by a pillow. The baby should at first be put to each breast in succession at each feeding.

With one arm around the baby, her hand supporting its back, and its head toward her breast, she should direct the nipple to the baby's lips with the first and second fingers of the opposite hand, and with these control the flow of milk if required, while with the thumb and rest of this hand the breast is prevented from pressing against the baby's face. The baby's nose should allow of the passage of air for breathing during the act of suckling. If the baby has a cold or a nasal discharge, resulting in "snuffles," or has obstruction of the nasal passages from any cause, medical advice should be sought. In such a case it may be necessary to move the baby from the breast from time to time to give it an opportunity of getting its breath.

LENGTH OF FEEDING-TIME.—On the *first day* the baby should be put to each breast in succession for about a minute and a half at each feeding.

On the *second day* the feedings may be lengthened to two or three minutes at each breast, the time being gradually increased, until at the *end of the week* the feeding at each breast occupies from eight to ten minutes. When the milk flow is thoroughly established, a baby should take from

ten to fifteen minutes over its feed. It should not take longer than fifteen minutes, and on no account should be allowed to go to sleep while taking the breast.

ALTERNATION OF BREASTS FOR FEEDING.—After the first week, if the mother has plenty of milk, the whole feed may be given from each breast alternately. When, however, the milk is scanty, both sides should be used at each feed, alternate breasts being used at the beginning, and the baby kept at the first breast as long as the milk flows freely (*v. Defects in the Mother's Milk*, p. 42).

QUANTITY OF MILK AT EACH FEED.—The stomach of a baby at birth is only capable of holding about 1 oz. or $1\frac{1}{2}$ oz. without becoming over-distended, but the capacity quickly increases, so that at the end of a fortnight it will hold about double the quantity and at the end of the month about 4 oz. If six feeds are taken in the day, this will result in some 24 oz. being taken.

Over-distension of the stomach is liable to result in the bringing up of a small quantity of the milk, or, if much discomfort is produced, in more forcible vomiting of the whole or greater portion of the meal.

Too rapid feeding may be followed by the same result.

After being fed, the baby should be returned at once to its cot, where it will usually sleep quietly

for several hours. It should be laid on its right side, as the full stomach is then less likely to be subjected to pressure, with the possible production of discomfort or vomiting.

WEAKLY BABIES.—Weakly babies may be unable to obtain the full amount of milk from the breast at each feed, and may require feeding at intervals of two or two and a half hours at first during the day, and to be given an extra feed at night.

TWINS.—In the case of twins, the milk must be divided between the two babies. A healthy mother has usually sufficient milk to nourish both satisfactorily, though in certain cases additional feeding or earlier weaning may be necessary (*v. Defects in the Mother's Milk*, p. 44).

It is a wise plan to weigh the baby twice a week, as this is the surest guide to its progress (*v. Weight*, p. 94).

DEFECTS IN THE MOTHER'S MILK.—The milk may be deficient in quality or quantity, or the two conditions may be combined. In such cases the baby will not gain in weight as it should, and becomes hungry and cries for its food long before the feeding hour.

Such a condition of the milk usually arises from the mother being out of health, and medical advice should be sought.

Poorness of quality may be detected by actual chemical and microscopical examination of the

milk. Samples of about an ounce may have to be drawn off with the breast-pump at the beginning and end of nursing, and examined on several occasions. As pointed out previously, poorness in quality of the milk may be the result of suckling at too frequent intervals.

Poorness of quantity, that is, *insufficient milk* for the proper nourishment of the child, is more easily investigated.

(a) The baby may be weighed on accurate scales before and after feeding, and the actual amount of milk taken estimated.

(b) The conduct of the baby when put to the breast is often a guide.

It may suck for a time and then drop the nipple with a cry, or when about to be removed from the breast it may make renewed attempts at sucking, only to discontinue them with a cry once again.

If it is then moved to the other breast, it continues to suck vigorously.

TREATMENT—(a) *The Mother*.—The treatment of the mother's health requires careful attention. If she is thin or anæmic, plenty of fresh air and good food are of first importance, and a change of air and the administration of a tonic may be ordered. The breasts may be soft and flabby and demand extra attention.

Her food should include plenty of milk, and extra milk, cocoa, or milky food may be given

half an hour or so before the time for feeding the baby.

Cod-liver oil, olive-oil, cotton-seed oil, or malt extract may also be prescribed by the doctor where required.

The mother must have plenty of rest during the day and of sleep at night, and the general principles of health should be observed.

(b) *The Baby*.—If the baby is able to obtain sufficient milk when both breasts are used at each feed, but a considerable amount is required from the second breast, the plan should be adopted of placing it to both breasts at each feed for an equal time, keeping it to each one for about eight minutes instead of to the first breast until the milk ceases to flow freely. In this way the supply of milk can often be increased.

If, however, both breasts become exhausted at each feed, and the baby is still unsatisfied, it becomes necessary to supplement the mother's milk with artificial food (*v. p. 47*).

EXCESS OF MILK.—Where the mother has a large amount of milk, care should be taken that the baby is not kept too long at the breast, but removed when satisfied. If too much milk is taken, the baby is liable to vomit after being fed. It may be necessary to draw off the surplus from the mother's breasts by means of a breast-pump.

OVER-RICHNESS OF MILK.—This may be associated with an excessive secretion of milk.

Where the milk is too rich in quality the baby is liable to vomit it in a sour-smelling, semi-digested condition shortly after being fed. Flatulence and colic are often also present, and the stools are pale and bulky and contain undigested matter, or diarrhoea may be set up (*v.* The Bowels, p. 116).

In this case the diet of the mother should be carefully supervised, the quantity being controlled and the richer foods eliminated or diminished in quantity.

Less meat, milk, and butter should be taken, and possibly more exercise taken.

It may be necessary for a few days to draw off the milk with a breast-pump and to feed the baby with it after it has been diluted with pure water (*cf.* p. 92).

CHAPTER V

WEANING

INABILITY OF THE MOTHER TO NURSE

A PART from deficiency in the amount of milk or other real or fancied errors dependent on the milk itself, there are certain conditions of the mother in which it is inadvisable for her to suckle her child. In all such conditions it is wise to have expert medical advice where possible. Weaning should normally be begun about the ninth month.

Weaning becomes necessary, however, at an earlier date :

- (a) If a woman is consumptive, or has active tuberculosis in any form.
- (b) If she is *seriously* ill with any acute or chronic disease, or suffers from great general debility or anæmia. (Slight illnesses should not lead to the weaning of the child.)
- (c) If she is suffering from severe inflammation or abscess of *both* breasts.

The reappearance of the menstrual periods

is no reason for weaning. In certain instances the digestion of the baby may be upset at this time, and feeding at the breast may have to be discontinued for a few days, but this is quite exceptional.

Epilepsy, unless the fits occur without warning, need not necessarily prevent nursing, but in the case of very emotional, excitable, or highly strung temperaments, especially where there is a history of insanity in the family, or in any grave mental disturbance, it may be considered advisable for the mother not to attempt to bring up the child on the breast.

PARTIAL INABILITY.—In the case of very delicate mothers, or where the supply of milk is actually deficient, supplementary feeds may have to be given in addition to the mother's milk. *If the mother has only a little milk*, the child should still have the breast, and medical advice should be obtained as to the best method of giving additional nourishment. The quantity of the additional food required will depend upon the amount still obtainable from the mother, and its strength must be adapted to the age and digestive powers of the child (*v.* Table, p. 78).

WEANING.—Let it be here repeated, “*If the mother is healthy and has plenty of milk, her own breast milk alone should be given until the baby is eight months old*” (*v.* Natural Feeding, p. 36).

In the case of a healthy mother and baby,

weaning should be carried out as a rule during the ninth month. It should be avoided if possible during the hot months of summer, being postponed, if both mother and baby are healthy, until the cooler weather.

Weaning should be a gradual process, and, if conducted over some weeks, the transition from the breast to artificial feeding can be carried out without any disturbance to the health of either mother or child.

It should not be begun before the beginning of the ninth month, and should be completed in a month's time.

At the beginning of the ninth month a bottle should be substituted for the 2 p.m. feed. At the end of the first week a morning bottle may be also substituted for the 6 a.m. feed, and at the end of the second week for the 10 p.m. feed. Finally, bottles should be substituted for the 10 a.m. and 6 p.m. feeds in the same way (*v. Hours of Feeding*, p. 39).

About the end of the ninth or tenth month the milk of the mother usually begins to fail in amount and becomes poorer in quality.

If nursing is continued long after this time, not only is the milk not sufficient for the baby's needs, but the mother herself is likely to suffer in health.

She loses energy, becomes weak and easily tired, and if the drain on her strength is con-

tinued, such troubles as anæmia, nervous depression, or weakness of sight are liable to occur.

In certain cases, where the mother is unable to continue suckling her baby from failure of health, from insufficiency of milk, or because the baby, in spite of the correction of all errors, ceases to thrive, weaning, partial or complete, may have to be begun before the age of nine months.

So also in acute severe illness of the mother, weaning may have to be undertaken suddenly at an earlier age.

In all these cases the nature and quantity of food given by bottle must depend upon the age and digestive powers of the baby (*v.* Artificial Feeding, p. 78).

There is usually but little difficulty in getting the baby to take the bottle, if the regular hours of feeding are kept to. Hunger supplies the best incentive to the taking of the bottle, and its claims soon overcome any dislike to the change on the part of the baby.

CRIES OF THE BABY.—In addition to the cry of *hunger*, a baby will often cry from *discomfort* or from actual *pain*.

The source of the discomfort should be sought for. It may arise from a wet napkin which requires changing, from some rough point or ruck or a band in the clothing which is too tight, or the

baby may be in an uncomfortable or cramped position, or too hot or too cold.

Indigestion or flatulence may cause discomfort only, or may result in dull aching or more acute griping pain (*v. Colic*, p. 119).

Continuous crying may often result from such digestive troubles, while the sudden, sharp cry resulting from a pin-prick or scratch may be quite distinctive.

Crying from being frightened takes place only in the later months, and does not occur in very young babies.

CHAPTER VI

ARTIFICIAL FEEDING

I.—Cow's Milk

AN INEFFICIENT SUBSTITUTE FOR MOTHER'S MILK

IN the early months of life no artificial food, however carefully compounded and prepared, is in any way an efficient substitute for the milk of the mother, but towards the end of the first year, when weaning should rightly begin, the increased digestive powers of the child are able to convert even a somewhat varied diet into an assimilable and nutritive form. Until this time, the longer a baby can be kept at the breast, the greater is the gain both for its proper nourishment and for its future development. Even if the mother has very little milk, it is extremely important that the baby should have it.

When artificial food is required before the ninth month, the milk of some animal—that of the cow being usually most convenient—must be used as

a basis for its preparation. Cow's milk, indeed, for the first two years of life, and even in later childhood, should constitute a considerable proportion of the food taken.

PURE COW'S MILK.—The difficulty in obtaining pure cow's milk is exceedingly great. Even where cows are kept privately the extreme cleanliness required in the care of the cow and its surroundings, and in all the arrangements as to milking, may be exceedingly hard to enforce, and where milk has to be sent long distances by train, and to the dangers of uncleanness at the source have to be added the risks of contamination or decomposition in transit, the menace to the baby's health is very real and serious.

INFECTION FROM MILK. — Many infectious diseases are transmissible by means of milk, and scarlet fever, typhoid fever, diphtheria, and other forms of sore throat are very liable to be spread in this way. Also, more especially in the summer months, the multiplication of various germs in the milk may give rise to widespread outbreaks of severe diarrhoea and vomiting, resulting in numerous deaths.

A special risk lies in the possibility of the transmission of tuberculosis from the milk of cows infected with tubercle, and though the action of public health authorities, by increased inspection, the testing of cows with tuberculin and the slaughter of diseased cows, may do much to miti-

gate this danger, deaths from tubercle arising from this source are still very frequent.

STERILIZATION OF MILK.—The only way to ensure against such dangers is to select the best milk-supply that is available, and to destroy the germs with which the milk may be infected, *i.e.* to sterilize the milk by boiling or by prolonged heat.

When a spirit-lamp is used for heating every precaution must be taken against the possibility of fire. The flame of a spirit-lamp is so little visible, especially in daylight, that the risks arising therefrom are considerable. Certain forms of spirit-lamp are, moreover, liable to explode, especially when full or overheated. Care must therefore be taken to use a trustworthy lamp, to guard against overfilling it, and to see that no curtain or other inflammable material can possibly come into contact with the flame. A nurse or mother should never attend to a lighted spirit-lamp while holding a baby.

(a) *Sterilization by Boiling.*—Boiling is by far the simplest method of sterilization. The milk should be obtained, if possible, twice a day, from the morning and evening milkings. As soon as it is received it should be placed in a clean double-saucepan. If milk is heated in an ordinary saucepan, it is very liable to “boil over” and be wasted. The water in the outer saucepan should be raised to boiling-point, while the milk is continually stirred to distribute the heat and prevent

the formation of a skin on the surface. This skin consists of a layer of casein and fat. The boiling should be continued for one minute, and the milk should then be poured into a perfectly clean jug, which has just previously been scalded out.

It should be protected from dust and flies by covering the jug with a perfectly clean saucer or a double layer of gauze or linen, and rapidly cooled by placing in a basin of cold water standing high enough to reach the level of the milk. The outer water should be changed for fresh cold water if it becomes warm.

Storage of Milk.—Layers of muslin or linen sewn round the edge and weighted with beads form convenient covers. The milk should be kept in a cold place—preferably near an open window, away from any sink, water-closet, or drain—and not in the kitchen, food-larder, or nursery.

(b) *Sterilization by Prolonged Heat.*—The milk, as soon as it is received, is modified when necessary (*v. p.* 62), and is then poured into thoroughly clean bottles, each one containing the amount for one feed. The number of bottles required will usually be five or six, according to the number of meals in the day. The whole quantity for twenty-four hours is thus prepared at one time.

The bottles are closed with india-rubber caps or with plugs of sterilized wool. These are then

placed in a deep saucepan or water-bath of warm water fitted with a lid. A rack to support and hold the bottles upright, with a handle to raise and lower it in and out of the saucepan, is a great convenience. The water is then raised to boiling-point, and kept boiling for three-quarters of an hour.

A Soxhlet apparatus (Fig. 6) is a convenient form for this method of sterilization.

PASTEURIZATION.
—In the process of “pasteurization” the same method is adopted as for sterilization by prolonged heat until the temperature of the milk reaches

170° F. It is then kept at this temperature for twenty minutes, rapidly cooled and stored in a cold place as previously directed.

Pasteurization has no advantage over sterilization, and does not kill germs so thoroughly.

After heating by either method the bottles are rapidly cooled by lifting them from the saucepan

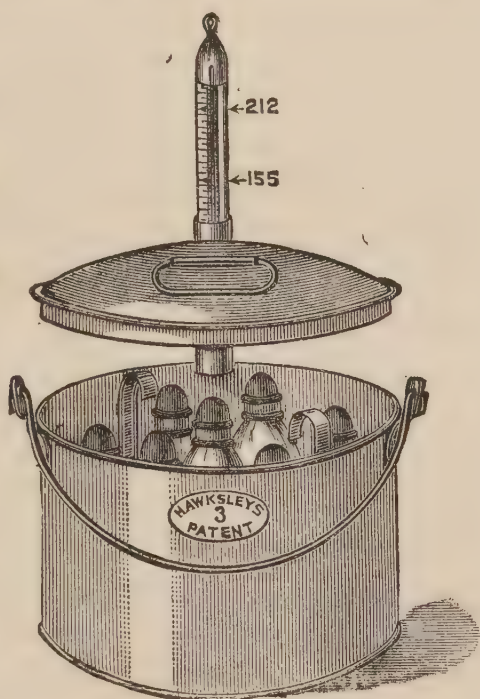


FIG. 6.—Soxhlet apparatus

or water-bath and standing them in cold water, as in the case of boiled milk. In hot weather it is an advantage to be able to keep milk on ice or in a refrigerator.

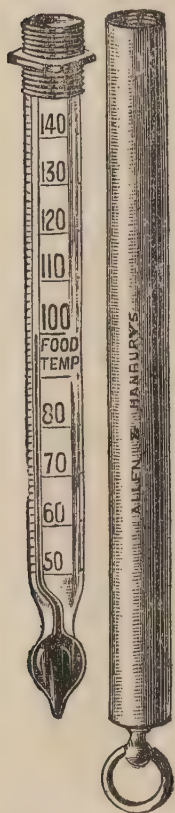


FIG. 7.—Food Thermometer

REFRIGERATOR OR ICE-BOX.—Tin-lined refrigerators, having a double non-conducting lining and containing a receptacle for ice, are clean and convenient.

An ice-box can easily be made by placing a wooden box large enough to contain the receptacle for the baby's milk within a somewhat larger box, so that a space is left all round between the two, which is packed with sawdust or hay. A lid padded with a cushion, also stuffed with sawdust or hay, should close down to fit tightly over the inner box, the height of which should be slightly lower than that of the outer one.

Though sterilization will not change a dirty into a clean milk or destroy the products of decomposition of milk that has already "gone sour," it will at least remove its chief dangers.

If, then, as good a milk-supply as possible be selected, and the milk itself is not sour when received, its immediate sterilization, with rapid

cooling afterwards, may be regarded as rendering it perfectly safe for the baby's consumption.

Sterilization either by boiling or prolonged heating has an effect also upon the curdling of milk when digested. The clot formed by boiled milk is less dense than that of raw milk, and that of milk sterilized by prolonged heating less dense still.

WARMING OF FEED.—Immediately before the baby is fed, the bottle containing the feed should be placed in hot water until the temperature has risen to 99° F. This should be tested by means of the food thermometer (Fig. 7), which must be perfectly clean.

In no case should a warmed feed be prepared long beforehand, or be kept warm for a later feed, for in warmed milk germs multiply with great rapidity.

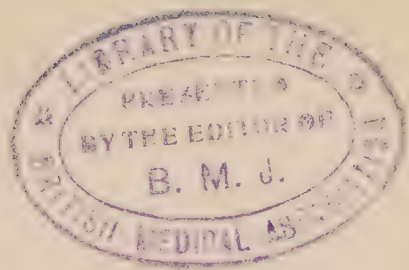
THERMOS BOTTLES (Fig. 8), though useful for keeping milk cold, should *never be used for keeping milk warm*.

When travelling, arrangements should be made for heating the feed immediately before it is given.



FIG. 8.—Thermos Bottle

Milk remaining in a bottle after feeding should not be kept for a later feeding, but should be thrown away and the bottle rinsed out and dried or placed under clean cold water. The bottle should be boiled before being refilled (*v. Cleaning of Feeding-bottles, p. 86*).



CHAPTER VII

ARTIFICIAL FEEDING (*continued*)

II.—Modification (Humanization) of Cow's Milk

HUMAN MILK

BREAST milk, the ideal food for the baby, contains the three chief forms of food—protein, carbohydrate (in the form of milk-sugar), and fat—together with a certain amount of mineral salts and water.

VITAMINES

In addition, milk contains substances termed “vitamines.” These bodies are crystalline in nature and exist in small quantities in many forms of fresh food, especially in fresh milk, raw meat juice, eggs, fruits and vegetables, and in brewer's yeast. The vitamins appear to be to some extent damaged when milk is sterilized or pasteurized.

HUMAN MILK AND COW'S MILK COMPARED

Though cow's milk is the ideal food for the calf, it is in several ways unsuitable in its un-

changed condition for the digestive powers and nutritional requirements of the human infant.

Considerable variations exist in the chemical composition of milk whether human or animal, but if average specimens be compared, the proportions of the various food elements are found to be somewhat as follows :—

	Human Milk.	Cow's Milk.
Protein . . .	1·75 per cent.	3·5 per cent.
Fat	4·0 „	4·0 „
Milk sugar . .	7·0 „	4·5 „
Mineral salts . .	0·2 „	0·7 „
Water	87·05 „	87·3 „
	100·00 per cent.	100·00 per cent.

The proportion of fat is that which is most liable to vary. From the above figures it will be seen that cow's milk contains about double the amount of protein and some 2·5 per cent less sugar than human milk. The amount of mineral salts is also some three times as much in the case of cow's milk.

There is a difference, moreover, in the nature of the substances which make up the protein and in the manner in which these substances are precipitated or curdle in the process of digestion.

The protein of milk is of two kinds, casein or curd and lactalbumin, which occur in about the following proportions, though individual specimens of milk will vary.

	Human Milk.	Cow's Milk.
Casein . . .	0.5 per cent.	2.85 per cent.
Lactalbumin . . .	1.25 „	0.65 „
	1.75 per cent.	3.5 per cent.

Owing to the smaller amount of casein in human milk it curdles but slowly in the process of digestion, with the formation of a light, flaky, digestible precipitate, while cow's milk, even if diluted, curdles quickly and forms denser, more bulky, and far less easily digested lumps, which are liable to be thrown up from the stomach or passed by the bowels in an incompletely digested state.

ASS'S AND GOAT'S MILK

Both ass's and goat's milk are occasionally used for the food of babies.

Their chemical composition differs from both that of human and cow's milk.

Average specimens give the following analyses :—

	Ass's Milk.	Goat's Milk.
Protein . . .	1·75 per cent.	3·5 per cent.
Fat . . .	1·5 ,,	4·0 ,,
Milk sugar . . .	6·00 ,,	4·0 ,,
Mineral salts . . .	0·35 ,,	0·9 ,,
Water . . .	90·4 ,,	87·6 ,,
	100·00 per cent.	100·00 per cent.

ASS'S MILK is more easily digested than cow's milk, and may be given to delicate infants for a time, if a supply is easily available. It is not rich enough in fat as a permanent food.

GOAT'S MILK does not differ much in chemical composition from cow's milk. It is, like cow's milk, too rich for the majority of babies, and similarly requires modification.

Goats possess the advantage of not being subject to tuberculosis, but in certain countries they suffer from, and in the past have been by means of their milk frequent transmitters of Malta Fever (Mediterranean or Undulant Fever).

MODIFICATION OF COW'S MILK

Though some babies are able to digest cow's milk in its unaltered state, it usually requires

modification in some way before it is suitable for the majority of infants.

I.—*Dilution with an equal Quantity of Water and the Addition of Cream and Sugar*

It will be seen from the above figures that by diluting cow's milk with an equal quantity of water the protein will be made approximately equal in amount—though not, however, in digestibility—to that which occurs in human milk.

The deficiency in fat and carbohydrate produced by this dilution may then be made up by the addition of cream and sugar and a mixture formed closely resembling human milk in composition.

Such a mixture would have the following formula :—

Cow's milk . . .	15 oz.	} To make 30 oz. or 1½ pint.
Cream, 40 per cent. . .	1½ „	
Sugar	1½ „	
Boiled water . . .	13½ „	

CREAM.—Cream that is purchased is usually prepared by centrifugalization of milk, and is termed “centrifugal cream.” It is thick in consistence and contains some 40 to 50 per cent of fat. Cream obtained by skimming is known as “gravity cream,” and contains about 15 per cent of fat.

Sterilization of Cream.—In large towns fresh sterilized cream may often be obtained, delivered

in small, sealed bottles. If it cannot be obtained in this form, the receptacle in which it is received should be opened at once on arrival, covered over the top with boiled linen or several layers of muslin, and stood in a saucepan of boiling water for three-quarters of an hour.

Fresh cream must be obtained to which preservatives have not been added.

SUGAR.—Sugar occurs in human and cow's milk in the form of lactose or milk-sugar. This is somewhat more digestible and less sweet than cane-sugar, but the latter is less expensive and may be employed in almost all cases quite satisfactorily as a substitute. In the form of brown sugar it is somewhat laxative.

Malt-sugar, in half the quantities of milk- or cane-sugar, may also be used, and aids in the formation of a finer curd during digestion. It has a slightly laxative action.

ACIDITY OF COW'S MILK.—Cow's milk is, moreover, liable to be slightly acid, even if only a short time has elapsed since the hour of milking.

The reaction can be easily tested by means of litmus papers, blue litmus being turned red by the presence of acid.

This acidity should be neutralized by the addition of an alkali, the most convenient forms for this purpose being lime-water, saccharated lime-water, and bicarbonate of soda.

Lime-water, besides its property of neutraliz-

ing acid, is very useful in lessening the density of the casein clot, but has a slightly constipating action.

It is usually employed in the proportion of about an ounce to a pint or a tablespoonful to a feed of 8 to 10 oz.

Saccharated lime-water is some twenty times as strong as lime-water, and is consequently used in much smaller doses—about twelve drops corresponding to a tablespoonful of ordinary lime-water. It keeps well, and, on account of its greater concentration, is especially convenient when travelling.

Bicarbonate of soda is used in the same way, in the proportion of one or two grains to each ounce of milk in the feed.

If, then, we add lime-water in the proportion of 1 oz. to the pint to the above mixture, diluting the milk with an equal quantity of fluid made up of cream, lime-water, and boiled water, and adding sugar to the required amount, the mixture will have the following formula :—

Cow's milk . . .	15 oz.	} To make 30 oz. or 1½ pint.
Cream, 40 per cent. . .	1½ „	
Sugar	1½ „	
Lime-water	1½ „	
Boiled water . . .	12 „	

Such a mixture is very suitable for a baby in about the third month of life, but in younger or more delicate infants the difficulty of digesting

the heavy casein clot may necessitate further modification (*v.* III.).

II.—*Dilution with Barley-water, etc.*

Other fluids than water may also be used, such as barley-water, oatmeal-water, or rice-water.

The power of digesting starch is very feeble in the first two months of life, but rapidly develops after this time, and from the third month onwards both barley-water and oatmeal-water, if carefully made, are well digested, and serve as suitable diluents to the milk, as well as an aid to nutrition.

The milk formula will be the same as the previous one, with the substitution of 12 oz. of barley-water for the 12 oz. of boiled water.

Barley-water.—Barley-water is best made in the following way:—

Wash one tablespoonful of pearl barley and put it, with a pinch of salt, in a saucepan with 1 pint of cold water. Heat it until it boils, and then let it simmer for half an hour. Strain through fine muslin and cool. This should be prepared twice daily.

One of the most frequent errors in the artificial feeding of infants is the use of prepared or powdered barley in the making of barley-water.

If a powdered barley is used, a large amount of the barley may remain in the barley-water in

an undissolved form, *i.e.* in a state of suspension, and, on account of its extreme fineness, cannot be removed by straining. This is a frequent cause of digestive troubles in young babies.

Oatmeal-water and *rice-water* may be made in the same way, with a tablespoonful of coarse oatmeal or of rice to a pint of water.

III.—*Further Modification*

This may be carried out in many ways:—

i. **By further Dilution—(a) With Water.**

Cow's milk may be still further diluted and brought up to the strength of human milk in fat and carbohydrate by the addition of cream and sugar.

Further dilution than in the proportion of half and half will, however, reduce the protein to less than the proportion in which it occurs in human milk.

In cases of difficulty in digestion this is, however, an advantage, and in the case of babies in the early months or in weakly babies such a mixture is often required.

If milk be diluted with double the amount of fluid, the formula of this mixture will be:—

Cow's milk . . .	10 oz.	} To make 30 oz. or 1½ pint.
Cream, 40 per cent. . .	2 "	
Sugar . . .	1½ "	
Lime-water . . .	1½ "	
Boiled water . . .	16½ "	

ii. By further Dilution—(b) With Whey.

If whey is used as a diluent, the protein in the mixture may be brought up to the amount in which it occurs in human milk, for we have in whey a fluid which contains a small amount of protein, together with milk-sugar and a small proportion of fat.

If whey then be used instead of water in the last mixture, not quite so much sugar and cream will need to be added.

The formula for such a mixture will be :—

Cow's milk	.	.	10	oz.	} to make 30 oz. or 1½ pint.
Cream, 40 per cent.	.	.	1½	„	
Sugar	.	.	1	„	
Lime-water	.	.	1½	„	
Whey	.	.	10	„	
Boiled water	.	.	7	„	

WHEY.—Whey is made by curdling milk with rennet and then straining off the curd.

To prepare Whey.—Place a pint of milk in a clean jug. Heat to 105° F. by placing it in a saucepan of hot water. Then add one teaspoonful of a good extract of rennet. In a few minutes a firm clot is formed. Break this up thoroughly with a clean fork. Then heat to a temperature of 170° F., and keep at this temperature for five minutes. This increased heat prevents the further action of the rennet.

Strain off the curd through a cleaned and boiled strainer, and collect the whey which runs through.

Whey is used not only for diluting cow's milk for young or delicate babies, but, in illness, is often used as a food, either alone, or with the addition of cream and sugar.

Such formulæ as

Cream, 15 per cent . . .	6 teaspoonfuls,
Milk sugar . . .	1 teaspoonful,
Whey . . .	4 oz., or

Cream, 40 per cent . . .	2 teaspoonfuls,
Milk sugar . . .	1 teaspoonful,
Whey . . .	4 oz.,

are often made use of where the difficulty of digesting casein is great, while in many cases of vomiting or diarrhœa whey alone is a food of the greatest value.

IV.—*Addition of Citrate of Soda*

The addition of citrate of soda in the proportion of 2 grs. or less to each ounce of milk in the food is of very great aid in the digestion of casein clot.

This may be added in the form of tablets, or may be conveniently dissolved in water in such strength that a teaspoonful containing the amount required can be added to each feed.

Citrate of soda may be added to the diluted mixture or, in the case of stronger infants, to undiluted cow's milk. The acidity in either case may be neutralized at the same time by the addition of lime-water or bicarbonate of soda (*v. p.* 64).

Citrate of sodium causes the casein to be thrown down in the process of digestion in the form of a lighter and more flocculent clot, and thus renders it more easy of digestion.

The addition of half the quantity of citrate of sodium or 1 gr. to each ounce of milk may be used as a stepping-stone to its discontinuance as the baby's powers of digesting casein improve.

V.—*Peptonization (Pancreatization)*

The peptonization or pancreatization of milk is a method of producing a partial digestion of the curd. It is carried out by heating the milk to a temperature of 110° F., and then adding a certain quantity of some pancreatic ferment. It should be kept at this temperature for ten to fifteen minutes and then thoroughly boiled.

A suitable milk mixture may be first prepared. Peptonizing powders suitable for the peptonizing of 1 pint of milk are the most convenient for use. They usually contain in addition to the ferment bicarbonate of soda sufficient to neutralize the milk's acidity. When this is the case it is inadvisable to add lime-water in addition. The boiling of the milk stops the peptonizing process.

Peptonization should be employed only under medical advice, and should not be continued for a long period. It should be left off by degrees, fresh milk being gradually substituted in the

feed. Peptonization probably destroys to a great extent the vitamins of the milk.

VALUE OF VITAMINES

As mentioned before (*v.* Human Milk, p. 59), fresh milk contains crystalline substances known as vitamins, which are largely destroyed by prolonged heating of the milk and especially by peptonization.

These substances, though existing in very small quantity, are essential to health. They appear to prevent the onset of scurvy, from which babies deprived altogether of fresh food are very liable to suffer.

It is possible also that other substances besides vitamins present in fresh milk are also destroyed by the processes of sterilization and peptonization.

The best way to supply this deficiency is by the addition of a small quantity of fresh fruit or vegetable juice to the diet. Orange juice is usually easy to obtain and the form most frequently employed.

ORANGE JUICE.—In all cases where a baby is being artificially fed, without any milk from its mother, fresh fruit juice should be given daily after the first month.

At the end of the third month its use becomes increasingly important.

Orange juice is one of the most convenient

forms, as it is present in the fruit in considerable quantity and is less sour than the juice of many fruits. Lemons, limes, grapes, or apples may also be used. Where fruit cannot be obtained, fresh juice from a thoroughly cleansed and scraped raw carrot may be substituted.

The juice must be prepared from sound fruit immediately before use, and should be strained from all solid portions of the fruit and diluted with twice the amount of water. If very sour, it may be sweetened with a little sugar and a grain or two of bicarbonate of soda added to each teaspoonful.

It may be given early in the morning, an hour before the first feed, or between feeds during the course of the day.

During the second month ten drops should at first be given daily, increasing gradually to a teaspoonful (half a teaspoonful twice a day) by the beginning of the third month. During the third month this should be increased to two teaspoonfuls (one teaspoonful twice a day), and at the end of the year the child should be taking a tablespoonful twice a day. If it cannot be given every day, it may be given two or three times a week with great benefit.

CHAPTER VIII

ARTIFICIAL FEEDING (*continued*)

III.—Details of Feeding

QUANTITY OF FOOD AT A MEAL (*v.* Natural Feeding, p. 41)

ARTIFICIAL feeding should be made to resemble natural feeding as closely as possible not only in the composition of the food itself, but in the quantities taken at each meal, the hours and intervals of feeding, the length of time occupied in feeding, and attention to the baby during the act.

When the baby is at the breast it is usually able to draw the amount required to allay hunger and satisfy its needs, the breast itself being stimulated to secrete by the act of sucking.

The amounts consumed at a meal vary with the individual baby and with the same baby at different times.

This adaptation of quantity according to the varying needs of the baby cannot be exactly reproduced in artificial feeding.

If a baby is well it will usually finish its feed if this is given in the quantity suitable for its age (*v.* Table, p. 78). If the bottle is not finished, or the baby is not taking it satisfactorily, at the end of the feed, after an interval of some ten to fifteen minutes the bottle should be removed. On the other hand, if the baby constantly appears hungry, even after the meal is completed, a slight increase should be made in the amount of the feed.

It is best to be acquainted with the *average* requirements of the baby at different ages, for which tables are useful. Such tables, however, should be used only as a guide and not as hard-and-fast rules, either as regards quantity or strength of the food given (*v.* Table, p. 78).

Babies with delicate digestions may require further dilution of the milk or a lesser quantity than that given in the table. The amount of food required will also be increased in cold weather or in cold surroundings, and with increased energy and activity on the part of the infant.

Sudden changes in either strength or quantity should never be made.

OVER-FEEDING

A child is much more likely to be over-fed when being brought up on artificial food than when it is at the breast (*v.* Natural Feeding, Excess of Milk, Over-richness of Milk, p. 44).

If too much food is taken at a meal, the baby is liable to regurgitate a portion of it, or to vomit after its meals (*v. Vomiting*, p. 119). Flatulence and colic may accompany the vomiting.

If constantly overfed the baby, after gaining weight much too rapidly, may cease to gain, and, if digestive troubles are at all severe, to lose weight. Its cheeks are often red and its skin over-active. It is especially liable to perspire about the head and to suffer from skin rashes. The stools are often bulky, loose, and offensive, and may contain much mucus.

If special forms of food are being taken in excess, the stools may present certain peculiarities (*v. Addition of Sugar and Cream*, p. 79). If protein is in excess, the odour is often very offensive, if fat, they are often pale and hard, while with the consumption of too great an amount of sugar they are often acid and redden the skin about the rectal opening. All forms of excessive feeding are liable to set up diarrhoea and vomiting, especially in the hot weather.

UNDER-FEEDING (*v. Defects in the Mother's Milk*, p. 42)

When a baby is under-fed it remains small and does not gain weight to the right amount. In severer cases it may lose weight, and if the conditions of under-feeding persist, it becomes pale and thin, the skin is wrinkled and hangs in folds

about the limbs, and the muscles are soft and flabby. It may cry with hunger long before the hour for feeding arrives.

In slighter cases of under-feeding, though there may be much loss of fat, the child may remain firm and wiry.

HOURS AND INTERVALS OF FEEDING

In by far the majority of cases feeding at three-hourly intervals at first and from the fifth month onwards at four-hourly intervals can be maintained with entirely satisfactory results.

Strict regularity and punctuality in the hours of feeding must be observed. Feeding should not be required at night (*v. Breast Feeding*, p. 39).

LENGTH OF TIME FOR FEEDING

The time occupied in feeding should be from ten to fifteen minutes. In some instances a baby may take as long as twenty minutes, while vigorous babies will often finish the feed in ten minutes or even less. Feeding should not take more than twenty minutes.

The length of time taken in feeding will depend too upon the ease with which the milk is obtained from the bottle (*v. Feeding-bottle Teats*, p. 88).

ATTENTION TO THE BABY AT THE TIME OF FEEDING

A baby's bottle should always be held throughout

the process of feeding. The teat should be pulled slightly forward from the baby's lips, and should be occasionally moved in the baby's mouth. This leads to more vigorous sucking, as well as to active movement of the whole body.

The food should be taken slowly, and the baby should lie in a comfortable position upon its back or turned to the right side, with the head and shoulders slightly raised. When the feed is finished or when the baby ceases feeding, the bottle should be removed. A baby should never be allowed to suck at an empty bottle or to lie or go to sleep with the teat in its mouth.

A certain amount of air is usually swallowed at the time of feeding. The baby should be gently raised into the upright position after feeding, when any excess of air thus swallowed is usually brought up.

It should then be quietly placed on its right side in its cot, when, if warm and comfortable, it will usually go to sleep.

A baby should never be carried about, shaken, or jolted immediately after a meal, but should be left as quiet as possible for some two hours.

THIRST

In hot weather or at other times a baby may suffer from thirst, and may cry on this account. A small quantity of pure cold water may be given if necessary an hour or so before meals.

QUANTITY TABLES

The following table will show the quantity of food and the degree of dilution required in an average case, according to the age of the baby.

It must always be borne in mind that differences exist in each individual baby, and that it is of first importance that the food should be adapted to its digestive powers.

When artificial feeding is begun for the first time, the feed should be only half the strength of that usually suited to the age, and should be gradually increased if it is well digested.

QUANTITY TABLE.

Age.	No. of Feeds.	For each Feed.			Daily amount in Ounces.
		Quantity of Food in Tablespoonfuls.		Sugar in Tea-spoonfuls.	
During—					
1st week	6	1 cow's milk	2 Boiled water	$\frac{1}{4}$ — $\frac{1}{2}$	9
2nd „	6	2 „	4 „	1	18
3rd „	6	3 „	4 „	1— $1\frac{1}{2}$	21
4th „	6	$3\frac{1}{2}$ „	$4\frac{1}{2}$ „	„	24
2nd month	6	4 „	$4\frac{1}{2}$ „	1—2	$25\frac{1}{2}$
3rd „	6	$4\frac{1}{2}$ „	$4\frac{1}{2}$ Barley-water*	„	27
4th „	6	$5\frac{1}{2}$ „	$4\frac{1}{2}$ „	„	30
5th „	5	8 „	5 „	„	$32\frac{1}{2}$
6th „	5	9 „	5 „	„	35
7th „	5	10 „	5 „	„	$37\frac{1}{2}$
8th „	5	11 „	5 „	1	40
9th „	5	$11\frac{1}{2}$ „	5 „	1	$41\frac{1}{2}$
10th „	5	12 „	5 „	1	$42\frac{1}{2}$

* v. p. 66, How to make Barley-water.

Addition of Sugar (v. p. 64)

The above amounts only indicate approximately the amount of sugar that should be added. If sugar is taken in excess, the stools are liable to be loose and irritating, so that the skin about the rectal orifice may become red and inflamed. If this occurs, the sugar should be reduced in quantity. Increase in the amount of sugar in the feeds should be made gradually. Babies differ greatly in their capability of digesting sugar, so that small quantities should be at first added and an increase made gradually.

Addition of Cream (v. p. 63)

The addition of cream to the feeds requires even more care than that of sugar. It should be added at first in extremely small quantities, and increased very slowly up to a teaspoonful or a little more of thick cream to each feed, careful watch being kept that there is no tendency to vomit, nor to the passage of pale and hard stools.

In certain babies the intolerance to fat in the form of cream is so great that it is better discontinued altogether, and cod-liver oil, either pure or in the form of an emulsion, substituted for it.

TOP MILK

Another method of increasing the amount of fat in the baby's food is to remove the upper fourth from a vessel of cow's milk which has been standing in a cool place for six or seven hours. Such "top milk" contains about three times the amount of fat in ordinary cow's milk, and must therefore be diluted before use. This dilution may be made partly with boiled water and partly with whey, to bring the amount of protein to the right proportion (*v. p.* 68).

If the cream is supplied by the use of top milk the formula on p. 68 becomes :—

Top milk . . .	10 oz.	} To make
Sugar . . .	1 „	
Lime-water . . .	1½ „	
Whey . . .	12 „	
Boiled water . . .	6½ „	
		30 oz. or
		1½ pint.

For delicate and young babies the amount of fat in the food prepared by this method may be found to be too great, and further dilution may be required, or the top milk may be made less rich by allowing the milk to stand for a shorter time before being skimmed.

CHAPTER IX

ARTIFICIAL FOODS

ARTIFICIAL foods are of various kinds, and may be classified according to their nature. They have one great advantage in being, in the majority of cases, sterile, *i.e.* free from germs.

I. DRIED MILKS (Milk Powder).— Many forms of dried milk are now procurable, and those that are prepared from pure, fresh cow's milk form, when dissolved in a suitable amount of pure boiled water, a mixture closely resembling cow's milk in composition, easily digested and free from germs. The amount of fat is often somewhat deficient, and if the powder has been prepared from milk from which the cream has been partially removed, or from skimmed milk, this deficiency may be so great as to render it, without the addition of cream, quite unsuitable for a baby's food.

The curd formed in the digestion of milk made from milk powder is much less dense and consequently more digestible than that formed from untreated cow's milk.

II. CONDENSED MILKS. — Condensed milks may also be made from skimmed milk, but when this is the case they are quite unsuitable as a complete food. Those made from fresh cow's milk may be classified into *sweetened* and *unsweetened*.

Unsweetened condensed milk is ordinary cow's milk which has been concentrated and sterilized by heat. If some two to three times the amount of water be added, a mixture closely resembling cow's milk is obtained. Unsweetened condensed milks decompose more readily after being opened than sweetened milks.

Sweetened condensed milks contain a large amount of added sugar. If diluted to the sweetness of ordinary cow's milk they are greatly deficient in fat. When, however, there is a difficulty in digesting ordinary cow's milk, even if diluted, or a special intolerance for fat on the part of the baby, diluted condensed milk may often be used for a time with great benefit.

The curd formed in the digestion of condensed milks is also less dense than in the case of untreated cow's milk.

III. MALT-SUGAR FOODS are prepared from starch by the complete conversion of the starch into soluble substances. They are only suitable as additional foods for infants in the later months of the first year, and in no way as complete foods. Mixed with milk, they lessen the

density of the casein curd formed in digestion. Mellin's Food is of this type.

IV. DRIED MILK WITH MALT-SUGAR.—For a complete food this contains too much sugar, and like the malt-sugar foods above should only be used in the later months as an addition to other food. Horlick's Malted Milk and Allen and Hanbury's No. 2 Food are examples of this class.

V. PARTIALLY MALTED FLOURS (partially digested starch).—These foods consist of starch, and contain a malt or pancreatic ferment. When made according to the directions supplied, a portion of the starch is converted into malt.

They consist chiefly of carbohydrates, with a small quantity only of proteid. They also are only of use as a supplementary diet in the later months of the first year.

Added to milk they also aid in the prevention of a dense casein clot. Benger's Food and Savory and Moore's Food are examples of this kind.

VI. STARCHY FOODS.—These consist of starchy foods in which a small proportion only of the starch has been transformed into dextrins—a more soluble and digestible form—by the action of heat.

They may also be employed as additional food to milk towards the end of the first year. Ridge's Food and Neave's Food are of this type.

Proprietary foods should only be employed under medical advice. Where such preparations are being taken in the place of milk, the addition of fruit-juice to the diet is especially important.

ADDITIONAL FOOD IN THE FIRST YEAR

At six months of age, a bacon, chicken, or chop bone, from which all but a trace of meat has been removed, may be given to the baby to suck at the end of the meal once or twice a day. This helps to exercise the jaws, and promotes the growth and development of the teeth.

During the ninth month, if teeth are present, the baby may have a little fine bread and milk, bread-jelly, barley-jelly, or the yolk of a lightly boiled egg, once a day, at the 2 p.m. meal.

During the tenth month the baby should be given a dry crust or some form of dry, solid food, such as a small piece of crisp toast or a rusk to suck, munch, and nibble at during the course of the 2 p.m. meal. Care should be taken that too large a piece is not bitten off, lest the baby run the risk of choking.

From the ninth month to the end of the first year 1 pint to 1½ pint of milk will be required daily. In addition to the food mentioned above, the baby may have, not oftener than twice a day, bread and milk, plain milk pudding, boiled porridge made with milk, or thin bread and butter.

In the twelfth month red gravy with a little mashed potato or breadcrumbs may be given in addition at the 2 p.m. meal.

At the end of the first year the baby should have three meals: breakfast, 7 a.m.; dinner, 1 p.m.; and tea, 4 p.m. A drink of milk and a crust may be given at 10 a.m., and a drink of milk again at bedtime.

TO MAKE BREAD AND MILK.—Put a slice of stale bread without crust to soak in a basin of cold water for two hours, then pour off the water, beat up the bread, pour over it a quarter of a pint of boiling milk, and sweeten with sugar. This should be freshly made for each meal.

FEEDING-BOTTLES

The most scrupulous cleanliness must be observed in connection with every vessel, feeding-bottle, or article of any kind, such as spoon or thermometer, with which the baby's milk may possibly come into contact.

Bottles should be of such a form that they can be easily cleaned in every part. The inner surface should be smooth, and they should have no angles, corners, screws, or internal rims, and should not be stamped in such way that the marks or lettering project on the inner side. They must be able to stand boiling.

The best forms are the boat-shaped bottle (Fig. 9), open at both ends, so that it can be washed

through, or the wide, open-mouthed bottle (Fig. 10), which is easily cleaned from the end.

In all cases it is convenient for one side or end of the bottle to be flattened, so that it can be stood upright or laid on its side when not being used.

If the bottle is fitted with a valve (Fig. 11), this must be detachable to permit of being cleaned separately.

Feeding-bottles should have no tubes. Tubes



FIG. 9.—Feeding-bottle—boat-shape

are impossible to keep absolutely clean, and are a frequent source of vomiting and diarrhœa. Fortunately the tube bottle is rapidly disappearing. Bottles may be graduated so that the amount of milk they contain may be easily read.

Cleaning of Feeding-bottles, etc.—All jugs, utensils, feeding-bottles, valves, measuring glasses, and spoons should be washed with cold water immediately after use, and then with hot water to which a little washing-soda has been added.

If hot water is used at first, it coagulates the milk that remains and prevents its easy removal. Cold water washes most of the milk away, and the boiling water and soda then removes all traces of fat and renders the cleansing process complete.

A brush may be used for cleansing if required, but this, too, must be kept scrupulously clean, and should be well rinsed in the boiling water and soda before use.

All utensils should be boiled in water and soda once a day for ten minutes and then rinsed out again with cold boiled water.

Jugs may be dried by standing upside down on a clean surface or in a rack to drain.

Feeding-bottles may be dried in the same way, or in the oven, or may be kept immersed in clean boiled water until next required. They should be rinsed out again with clean boiled water before use.

Towels or cloths should not be used for the inside of any vessel connected with feeding. A food thermometer, after being placed in milk or



FIG. 10.—Feeding-bottle—wide-mouthed

food, should be cleaned at once with cold boiled water. It is a good plan to wipe it down with sterilized wool, if this can be obtained; otherwise, it is best left to drain and then placed in its case. It should be washed again with cold boiled water before use.

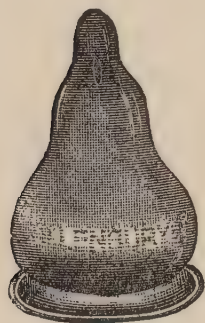


FIG. 11.—Valve for Feeding-bottle

TEATS (Fig. 12) should be made of pure indiarubber and should be large enough to be turned inside out.

The hole in the teat must not be too large or the milk will flow too freely, and vigorous action of the sucking muscles will not be encouraged.

If, on the other hand, it is too small, the milk will be obtained with difficulty, much air may be swallowed, and the child may get tired before the feed is finished, or the act of feeding may be unduly prolonged.

The flow should be so regulated that, if the bottle be held up when full, the milk drops with extreme slowness from the teat, and the length of the time that the baby occupies over its feed is from ten to fifteen minutes.

If the hole is too small it may be enlarged with a red-hot needle.

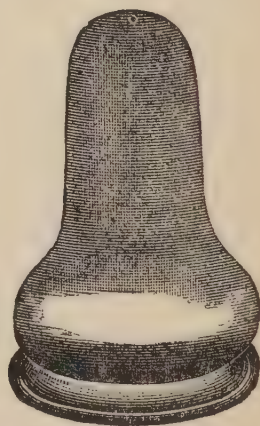


FIG. 12.—Teat for Feeding-bottle

A teat should never be placed in the nurse's mouth.

Cleaning of Teats.—Teats in use should be scalded once a day by pouring boiling water over them.

Immediately after being used, teats should be thoroughly cleaned both inside and out with warm (not too hot) water, rubbed with a little common salt, to remove all traces of milk, and then rinsed again in warm boiled water. A brush should not be used.

To dry them, the excess of water should be shaken off, and they should then be stood in a warm place.

Preservation of Teats.—India-rubber, if subjected to scrubbing, prolonged soaking, especially in solution of soda or boracic acid, or to great changes of temperature, is liable to perish, that is, to become soft and friable. If great care is not taken of the teat the hole soon becomes too large and the milk flows out too readily.

Teats, therefore, should be scalded only once a day. They last longer if kept dry and not exposed to light. The best method of preserving them is to place them when dry in a covered glass jar and keep them in a cool, dark cupboard.

CHAPTER X

PREMATURE BABIES

BABIES born before their full term are called premature. Their weight may be even under 3 lb., but their chance of survival in this case is extremely small. If weighing 4 lb. or more, though extremely delicate, their chance of living is considerably greater.

Besides being small and much under weight, they are in other ways undeveloped as compared with a baby born at full term. The nails may be ill-grown, the hair of the head may be absent, while the features appear pinched and compressed. Their movements and cry are feeble. Much of their existence is passed in sleep, and when awake they are listless and irresponsible.

WARMTH is of extreme importance in keeping a premature baby alive. It should be wrapped in wool immediately after birth, and should not be bathed, but cleaned with warm sweet oil with as little exposure as possible. The surface of the skin should be kept oiled, and it should be kept constantly enveloped in wool, a separate, changeable pad of wool being kept in place

with a **T**-bandage in place of a napkin. Light, porous flannel blankets or a fleecy woollen shawl should be used to provide additional warmth.

The air of the room should be fresh but warm, the temperature being kept about 70° F., and the baby must be carefully shielded from all draughts.

The baby's immediate surroundings should be kept at a temperature of about 80° F. This may be managed by placing it in an instrument maker's incubator, or in a padded cot or cradle, the temperature being maintained by means of hot-water bottles. Great care must be taken that these are separated from the baby itself by several folds of woollen material.

A convenient arrangement may often be improvised by placing over the baby a small "cradle" of the type used to prevent the pressure of bedclothes in the adult, and suspending from it an electric incandescent lamp.

A thermometer in all these cases should be fixed in position, and the temperature maintained at a uniform height of about 80° F.

The head of the child, though it may be protected by wool or by a head-flannel, should be so arranged that it does not lie down in a hole, but that it is able to obtain a free supply of air.

It may be a fortnight or even longer before the baby is strong enough to have an ordinary

bath, and this must be given at first rapidly, and with as little exposure or fatigue as possible.

The baby should be left very quiet, and moved as little as possible, except for the necessary changing and feeding. The light of the room should be kept subdued.

FOOD.—With regard to feeding, a doctor's advice should be sought. Some premature

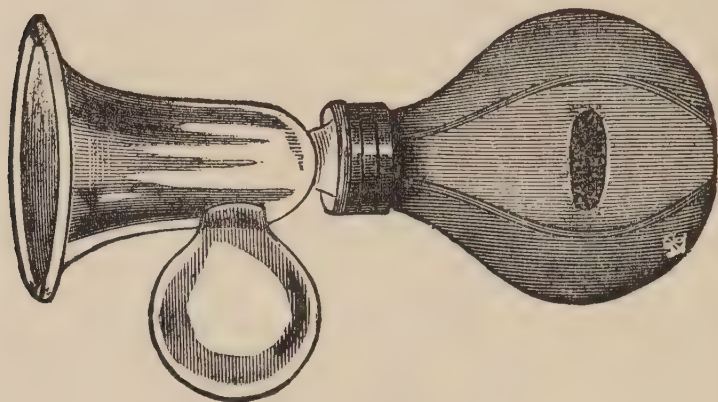


FIG. 13.—Breast-pump

babies are able to take the breast, but often they are too weak, when the mother's breast-milk should be drawn off with a breast-pump (Fig. 13), the first portion being thrown away for fear of possible contamination, and the milk then given to the baby either pure or, if there is any tendency to vomit, in a diluted state.

If the mother has no milk, or this has to be supplemented, a dilute milk, cream, and sugar mixture may be given (*v.* Artificial Feeding,

p. 67), or sweetened whey with or without added cream, or the milk may be peptonized.

Next to a mother's milk, that of a foster-mother or wet nurse is to be preferred to artificial feeding, as the most likely means of preserving life, but the inconveniences and difficulties arising in connection with her employment often make such an arrangement impossible.

Premature children are liable to remain delicate throughout the first year or two of life, and even throughout childhood, though many grow up quite strong and robust.

CHAPTER XI

GROWTH AND DEVELOPMENT

WEIGHT

IN a healthy normal baby there is a loss of weight of some 8 to 10 oz. in the first half of the first week. This is due to the amount of nourishment taken at this time not fully compensating for the loss which arises from the early emptying of the bowels and bladder, as well as that occurring in connexion with the active processes of life.

This loss, though often regained by the middle of the second week, may not be fully made up until the end of the third week of life.

From this time, until the end of the fourth or fifth month, the gain of weight proceeds steadily, some 4 to 6 oz. being added each week, or from 1 to $1\frac{1}{2}$ lb. or a little more per month. Thus at the end of the fourth month the weight should be nearly double what it was at birth.

After the end of the fourth or fifth month the gain of weight is rather less, some 3 to 5 oz. being added each week, or about 1 lb., or rather

less per month, so that at the end of the first year the weight should be about 21 lb., or some three times the weight at birth.

During the second year the average gain is about 8 oz. per month, the child gaining some

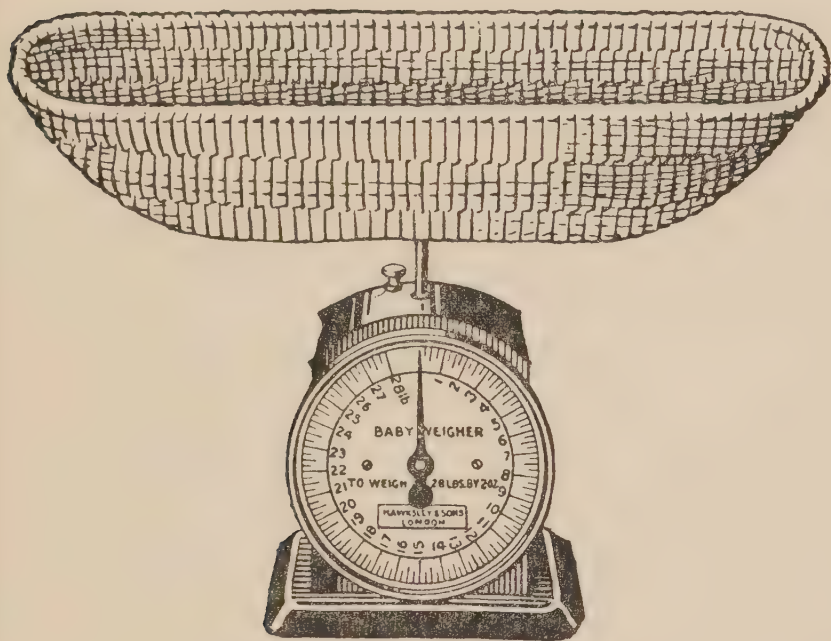


FIG. 14.—Weighing Machine

5 or 6 lb. during the year, and weighing at its end about 27 lb.

The average weight of a boy is, then, about 1 or 1½ lb. greater than that of a girl.

IMPORTANCE OF WEIGHING.—Regular weighing is the only means of judging accurately of a baby's nutritional progress (Fig. 14).

The baby should be weighed at birth and at

weekly intervals during the first year. At the first half of the second year the weight should be taken at fortnightly intervals, and after that at monthly intervals until the end of the third year.

A failure to gain weight to the right amount may be the first indication of some error in health or feeding. At the onset of a cold, or if the baby is "sickening" for measles or chicken-pox, the weight may remain at a standstill, or some ounces even be lost, while in acute illnesses, especially if accompanied by diarrhoea or vomiting, the loss may be excessive.

DEFICIENT GAIN IN WEIGHT.—If the gain in weight is deficient, its cause should be sought.

Where the baby is being fed upon the breast at the correct hours, and the mother appears to have plenty of milk, it may be necessary to weigh the child both before and after feeding in order to ascertain if the full amount of milk is obtained at each meal.

In some cases there may be difficulty in sucking, either from depression of the nipple or from weakness on the part of the child, or obstruction in the baby's nose may so interfere with breathing that continued and contented sucking becomes impossible.

In any case where a deficient gain in weight continues, a doctor's advice should be sought.

EXCESSIVE GAIN IN WEIGHT.—The gain in

weight should be regular and not only not less than, but *not greater than*, the normal. A too great increase of weight may be due to over-feeding or, especially in the later months after weaning is begun, to errors of diet, such as the giving of too much carbohydrate (cereal) food.

Such excessive weight may be accompanied by a loss of colour, with flabbiness of the tissues and insufficient nourishment of the bones in proportion to the weight of the body, and may constitute the first beginnings of rickets and be the precursor of bowed legs or other bony deformities.

LENGTH

At birth the baby should measure $19\frac{1}{2}$ or 20 in. in length. During the first month the increase in length is about $1\frac{1}{2}$ in., during the second month 1 in. or a little more, and during the third month rather less than an inch, so that at the end of three months the gain in length is from 3 to $3\frac{1}{2}$ in., the baby now measuring about 23 in.

During the second three months the gain in length takes place at a slower rate, being about $\frac{1}{2}$ in. per month, the total gain in length at the end of the sixth month amounting to 4 to 5 in. This rate is maintained until the end of the first year, the increase from the beginning of the seventh to the end of the twelfth month being about 3 in.; and the total gain in length during the

year about 8 in. or a little more. The baby now measures about $28\frac{1}{2}$ in.

GROWTH OF THE HEAD.—The size of the baby's head is considerably greater in proportion to its height than in the adult, being about one-fourth of the height, as compared with one-eighth in a fully grown man. The increase in its growth is rapid in the early months. At birth the circumference taken above the eyebrows and ears is about 14 in., at 3 months about 16 in., at 6 months about 17 in., at 9 months $17\frac{1}{2}$ to 18 in., and at the end of the first year about $18\frac{1}{2}$ in.

GROWTH OF LIMBS.—The baby's limbs are short in relation to the trunk, as compared with those of the adult, the legs being some three-eighths of the height. The limbs gradually grow in proportion to the trunk, until in the adult the length of the legs is about one-half of the height.

VARIATIONS IN RATE OF GROWTH.—Both as regards the rate of growth in weight and in length it must be borne in mind that considerable variations from the normal may occur even in health. The children of small parents tend on the whole to be smaller, while tall parents often have tall children. Changes in the weather as to temperature, moisture, and sunshine may play an important part in temporarily affecting the rate of growth, while apart from such influences seasonal changes appear to have a direct effect in causing an increase of growth in the spring and

summer as compared with the autumn and winter months. Should no other sign of illness be present, the baby continuing firm, lively, and happy, without loss of its colour, a temporary arrest in the normal rate of growth either in weight or length need give no occasion for alarm, but should this persist for some weeks, some fault in nutrition is indicated, and if the cause is not to be found and remedied, medical advice should be obtained. Quite slight digestive errors, if allowed to continue, may lead to failure in the proper absorption of food, and, if neglected, to the production of anæmia and rickets.

The error may lie in, or have arisen from, the quantity or quality of the food taken, in some irregularity in the hours of sleeping or feeding, or in defective hygienic surroundings.

In other cases, however, the failure in growth may be due to the onset of some acute illness, or to the chronic influence of some more serious disease.

THE EYES

The eyes at birth are devoid of the pigment that becomes developed in later life, so that the coloured portion or iris is at this time of a bluish slate hue. Gradually pigment is deposited in its substance, and the permanent colour of the eye becomes established. In other cases a delicate opalescence of the iris results in the formation of

the bright blue eye, which, like the blue sky or the blue of the Mediterranean, owes its colour to the breaking up of the light which floods into its depths and the reflection alone of the blue rays. The pupils of the eyes at birth are small, being contracted by the increased stimulation of the retina, which results from the action of light in the absence of the iris pigment.

SIGHT.—Though the pupils react to light, any *conscious* appreciation of light appears to be at first entirely absent. The baby sees, but does not perceive. Soon, however, it distinguishes light from darkness, and in a few weeks may show consciousness of and pleasure in the presence of a bright light or a bright shining or sparkling object. This pleasure in bright objects is especially noticeable throughout infancy, and is retained, though perhaps in a lesser degree, in the later years of childhood and indeed throughout life.

At first the eyes tend to move independently of each other, their movements being irregular and not accurately co-ordinated, so that they have a vague and wandering expression, while a transient cast or squint may often be observed.

About the third month the infant begins to fix its eyes upon objects—to “take notice”; it may follow a bright light or object with its eyes, and recognizes its mother or nurse.

The movements of the lids, too, are independent

at first in the two eyes, while the act of winking is entirely absent, not becoming developed until about the end of the second month.

TEARS are absent from the eyes for the first few weeks of life, making their appearance, as a rule, towards the end of the first month.

THE EARS AND HEARING

At birth the infant is completely deaf, and remains so for the first day or two of life, the power of hearing only becoming established with the gradual expansion, with air, of the throat, nose, and ears.

Loud noises can usually be heard by the end of the first week, but the actual perception of less disturbing sounds is, like the perception of light and surrounding objects, a process of gradual development, and in the early weeks of life varying sounds elicit but little response.

The voice of the mother or nurse appears to be recognized, as a rule, from the fourth to the sixth month, and about the same time the infant begins to show signs of pleasure in sounds of a cooing or singing nature, while, a little later, rattling, jingling, or tinkling sounds are highly appreciated.

MENTAL DEVELOPMENT

A look of intelligence or its absence is detectable, as a rule, in the first weeks of life, but it is

not until the power of definite fixation of the eyes, with the ability to follow moving objects, is gained that any accurate idea can be formed of the degree of mental development. Quite marked instances of mental deficiency are often overlooked until the fourth or six month of life, or even later.

SMELL

The sense of smell is probably present in the normal infant from the moment of the expansion of the nasal passages with air, which takes place at birth. Ill-developed at first, its acuteness gradually increases, and, as in adults, becomes intimately associated with the sense of taste in the appreciation of flavours.

TASTE

The sense of taste is undoubtedly well developed even at birth, and the sensations of sweetness, saltiness, sourness, and bitterness are probably present from the first.

SENSATION

The sensibility of the baby at birth to touch, pain, and temperature is not at all well marked, but soon increases.

MUSCULAR MOVEMENTS

The movements of the baby are often extremely active from the first. When awake, the

legs are kicked about, the arms and wrists are constantly moved to and fro, the hands being often open and shut, the infant indulging at times in violent, inconsequent "plunges," while grimaces and movements of the head contribute to the general restlessness. Such movements are *impulsive*, being the result of nervous impulses sent down from the brain to the various muscles concerned.

Other movements appear from the beginning to arise in response to certain influences affecting the sensory nerves, and are termed *reflex*.

The first inspiration of the newly born infant is of this nature, and occurs in connexion with sensations—sensory stimuli, as they are termed—applied to the skin. The sneezing and coughing of the infant arise in like manner from sensations affecting the nose and throat. The establishment of various muscular movements in response to stimuli and their control by the higher centres of the brain play an important part in the mental growth and training of the child.

One very important reflex, which is highly developed at birth and essential to the very existence of the infant, is the sucking reflex. This is associated with stimuli applied to the neighbourhood of the lips, and consists of active movements of the lips, tongue, jaws, and cheeks.

This reflex constitutes what is termed an

instinctive act; the baby being born with the capacity for acting in response to a stimulus in a definite and purposive way. This "sucking reflex" is seen not only in connexion with breast and bottle feeding, but also in the habit of sucking the fingers, or, in fact, of anything which comes in the neighbourhood of the mouth, or which can be conveyed to it by the hand. The action, which is at first a purely instinctive one, gradually becomes more and more voluntary and purposive in its nature. It may be abused, as is all too frequently the case, in the employment of a "dummy" or "comforter" given the child to suck in order to keep it quiet (*v. p.* 115).

Many children often, long after they have been weaned and the bottle has been discarded for the cup, habitually go off to sleep sucking the fingers or thumb, or sucking or chewing the corner of a sheet or flannel. The persistence of the habit at this age is one that should be corrected.

So, with regard to other actions, as the child grows older the impulsive movements tend to become more and more voluntary, while the instinctive and reflex acts, such as the movement of a limb when touched, or the acts of swallowing or coughing, become to a certain extent controllable by the will.

Other reflex acts, such as the contraction of

the pupils to light, remain permanently outside the will-control.

Movements also arise directly in connexion with the feelings of the infant, *i.e.* are emotional in origin.

The movements thus produced are often exceedingly complex, and the grimaces and changes of expression associated with pleasure and pain are manifold in their variety, while the acts of laughing or crying may affect the movements of the whole body. It is on the development of voluntary movements that the progress of the child greatly depends.

The muscles of the neck in the early months are weak and quite unable to uphold the weight of the head. By the end of the third month they have increased considerably in strength and the movements of the head now become more voluntary, and in association with co-ordinated movements of the eyes the child begins to take notice of its surroundings. About the end of the third or in the fourth month it begins, as a rule, to hold up its head, to follow slowly moving objects with its eyes, and to exhibit more definite signs of pleasure or discomfort.

During the fifth and sixth month, by combined exercise of the faculties of vision and touch, it begins to take things into its hands, and in playing with its toys and other articles, to gain an idea of distance, form, and weight, as well as

of the surface characteristics of objects, such as smoothness, softness, or warmth.

By the sixth or eighth month it should be able to sit up with support, about the ninth month to begin to crawl, and, by the tenth or eleventh month, to sit up unsupported.

WALKING.—About the eleventh or twelfth month it begins, as a rule, to pull itself up and to stand with support, while at the end of the first year or a little later—sometimes, even if quite healthy, not till the fifteenth or sixteenth month—it begins to walk alone.

TALKING.—Children vary much in the age at which they begin to talk. The cry, which is at first a reflex act and may arise from the presence of an unpleasant stimulus, such as cold or hunger, gradually becomes associated with their removal by the action of the mother or nurse, so that the infant learns in this way to make known its wants. The cry becomes more and more a voluntary act, and with the judicious satisfaction of its wants the early training of the child begins.

The understanding of speech by the infant precedes the use of words, and by the imitation of its elders and the association of certain sounds with particular people or objects, it begins to use these as words with a definite meaning.

By the tenth or twelfth month sounds such as “Ba ” or “ Da ” begin to be employed, and about the end of the first year “ Ba-ba,” “ Da-da,”

“ Ma-ma,” “ Pa-pa,” or “ Na-na ” are used in a definite connexion. During the second year words become rapidly added to the vocabulary, and at the end of the second year short sentences are made use of.

In some instances, however, in children who learn to talk perfectly well and are in other ways quite normal, the ability to talk may be delayed even till the middle or end of the third year. If there is no power of talking by the end of the second year, advice should, however, be sought, for the fault may possibly be in deafness or some mental backwardness. Severe illness or rickets, by which the nutrition of both body and brain may be affected, may in other cases be the cause of the delay.

CHAPTER XII

EXERCISE AND SLEEP

EXERCISE

EXERCISE is essential for proper growth and development. It quickens the circulation, increases the depth of respiration, is a stimulus to appetite and digestion, and produces undisturbed and refreshing sleep.

During the first fortnight but little exercise is taken by the baby, except at the times of being bathed and dried, and to a certain extent while being fed.

After a few weeks the time for exercise should be prolonged, and for twice a day, for fifteen or twenty minutes, it should have "kicking times," in which the natural movements of the arms, legs, and body can be freely indulged.

The room should be warm and free from draughts, and the baby should lie on a bed, unhampered by clothing. Later on, when the baby begins to crawl, a nursery pen forms a useful playground.

About the tenth month babies will begin to "pull themselves up" with the aid of some

support. Both standing and walking should take place as voluntary acts on the part of the baby, and assistance should not be given, or more weight is liable to be thrown upon the legs than they can properly support.

SLEEP

A new-born baby should spend nine-tenths of its time in sleep. At the end of three months this will be decreased to three-fifths, and at the end of six months to two-thirds of its time.

It should sleep in a separate cot, and preferably in a separate room to its mother and nurse.

In fine weather it may sleep much of its time in the open air. At the end of the first week it may be taken out for fifteen minutes or more, but in cold or wet weather several weeks may elapse before this is advisable, and it should be first accustomed to changes of temperature by taking it for a time into a cooler room with the window open, keeping it, of course, warm and protected from draughts.

It should sleep from 10 p.m. to 6 a.m. If it wakes during the night it should not be taken up except to be "changed" if necessary, but should be given a little water and settled comfortably in its cot.

It should be accustomed to going off to sleep without being rocked or sung to, or with a teat or anything to suck in its mouth.

CHAPTER XIII

THE TEETH

THE TEMPORARY TEETH

THE temporary teeth, though existing in the jaw at birth, together with the rudimentary origins of the permanent teeth, do not usually begin to be cut until the seventh or eighth month. They may, however, make their appearance before this, and in rare instances are cut before birth.

Although great variation may occur in their time, manner, and sequence of being cut, the table (p. 111) shows approximately their date and order of appearance.

The lower lateral incisors (d.d) are often not cut before the end of the first year, so that at this time the baby has then six and not eight teeth.

The canine teeth (f.f.f.f) are usually cut after, rather than before, the end of the eighteenth month, so that at this age there are usually twelve teeth, and the second molars (g.g.g.g) are usually cut after the end of the second

year, so that the child at this time will have sixteen teeth.

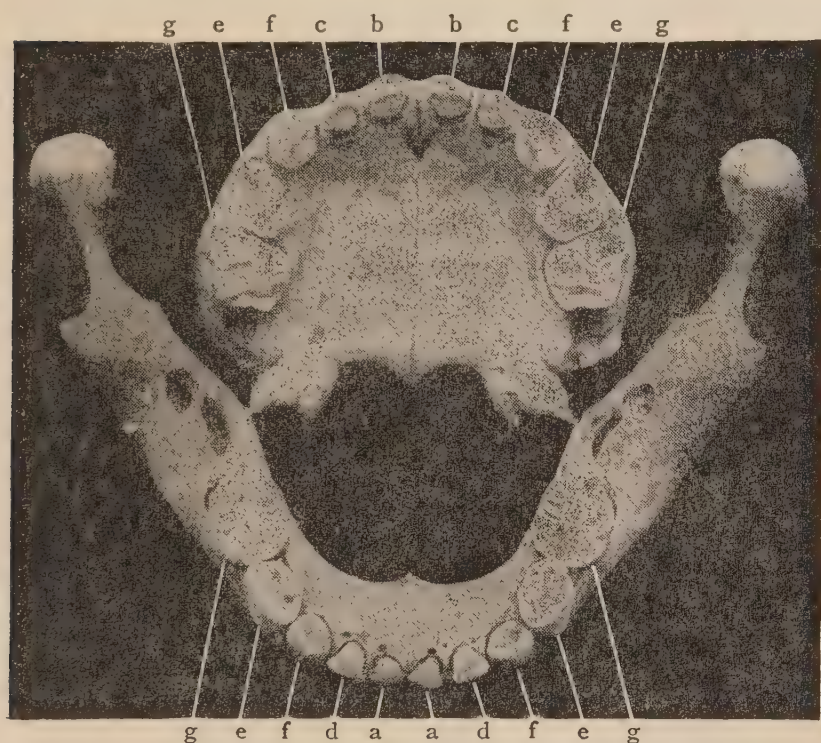


FIG. 15.—The temporary Teeth

ORDER OF ERUPTION

Lower central incisors .	a.a. .	7 to 8th mth.	=	2 teeth.
Upper „ „ .	b.b. .	8 „ 9th „	=	4 „
Upper lateral „ „ .	c.c. .	9 „ 10th „	=	6 „
Lower „ „ .	d.d. .	10 „ 12th „	=	8 „
First molars .	e.e.e.e. .	13 „ 14th „	=	12 „
Canines or eye-teeth .	f.f.f.f. .	18 „ 20th „	=	16 „
Second molars .	g.g.g.g. .	24 „ 30th „	=	20 „

Delay in cutting the teeth may arise from any cause affecting the health, whether in the form of

acute illness or from general malnutrition such as rickets. Ill-health may also result in the teeth being defective, so that they quickly decay.

TEETHING

Cutting of the teeth, though usually not producing any constitutional upset, is sometimes attended by slight disturbances of health, the baby being feverish, restless, and often fretful and irritable. It may sleep badly, dribble much from the mouth, and suffer from loss of appetite or slight digestive trouble. Skin troubles, such as red spots, nettle rash, or eczema, may also occasionally arise.

In certain cases, colds or attacks of bronchitis may accompany the cutting of teeth, or possibly vomiting, diarrhoea, and convulsions, but it is a mistake in the case of *severe illness*, occurring at the same time as the cutting of a tooth, to regard teething as the cause, for in most cases its origin is to be found elsewhere.

Treatment.—In any at all serious disturbances of health, medical advice should be obtained. A warm bath and putting the baby to bed will often do much to allay restlessness and discomfort. Food must be given of such a kind as can be thoroughly digested, and if the child is feverish, extra water may be given between feeds. A slight aperient may be given if the attack is at all

severe. No other drugs should be given without medical advice.

The gums should not be rubbed, and it is only in very rare cases, when tension is very great, that "lancing" of the gums is required. If there is much dribbling, a bib should be used and changed frequently.

The hands must be kept very clean, as they are frequently placed in the mouth when the teeth are giving trouble, and no article should be given to the baby on which to press its gums, except a bone or hard crust at meal-time, as previously recommended. A baby should be taught not to place substances other than food in its mouth.

PRESERVATION OF THE TEETH

Keeping of the teeth clean is all-important for their preservation. If the teeth are sound, and there is no disease of the mouth, the use of a brush for the teeth is usually not required until the eighteenth month. If the teeth are too crowded, they may need cleaning before this time with dental silk run between them, great care being taken not to injure the gums.

CHAPTER XIV

EDUCATION AND TRAINING

REGULARITY OF HABITS

TRAINING in *regularity of habits* should begin from the baby's birth, and with the observance of exact punctuality in the hours of feeding, followed by placing the baby in its cot to sleep, the foundation is laid for the control and regulation of conduct.

Care should be taken to begin as it is wished afterwards to go on, and from the first a baby should be put to sleep without being rocked or waited by, or sung to, or nursed.

Crying must not be too readily given way to, though sources of discomfort should not be overlooked (*v. p. 49*).

Love and wisdom must combine in the enforcement of a gentle and firm discipline with regard to all the early processes of life. Regularity of hours leads to regularity of conduct, and in taking up the baby at certain hours and holding it out at definite times, habits of cleanliness can soon be engendered.

OBEDIENCE, SELF-CONTROL, AND CHARACTER

As the baby grows, *obedience* to gentle, careful, and consistent management will establish the habit of *self-control*, in the practice of which lie the seeds of *character*. It is, indeed, on the proper nourishment of the brain and its training in relation to conduct and life, that depend the suppression of wickedness and vice and the maintenance of true religion and virtue.

THE COMFORTER, DUMMY, OR PACIFIER

The use of a comforter or dummy should never be permitted.

It is not only a danger to health, but it constitutes a bad habit and a self-indulgence which is harmful to character.

Constant, ineffectual sucking tends to injure the delicate mucous membrane of the mouth, and the swallowing of saliva which accompanies it to set up digestive disturbances.

The comforter, moreover, is very liable to become dusty and germ-covered, and may thereby be the direct cause of an attack of vomiting or diarrhoea.

Its use leads also to deformity of the mouth, unsightly protrusion of the front teeth, and, by narrowing the nasal passages, is largely instrumental in the production of adenoids and mouth breathing, with all their attendant evils.

CHAPTER XV

AILMENTS AND ACCIDENTS

IT is not intended to enter here upon the medical treatment of illness or injury, but only to deal with some minor details of nursing which can be carried out by mother or nurse until medical advice can be obtained.

As with regard to feeding and management in health, so much more in cases of illness can no hard-and-fast rules be laid down. Details of management must be adapted to the idiosyncrasies and requirements of the individual child.

The ailments of a baby in the first year of life are largely digestive in origin, and may to a very great extent be prevented by careful attention to regularity in the hours of feeding and to the quantity and quality of the food taken.

THE BOWELS

During the first few days of life meconium is passed by the bowels some three to six times a day.

After this the colour of the motions gradually changes to bright yellow, the bowels being open

two or three times in the twenty-four hours. After one month this is usually reduced to once or twice in the twenty-four hours.

The baby should be held out regularly twice a day after the 9 a.m. and 6 p.m. feeds for this purpose. A regular habit can often be thus established in a few weeks.

The appearance of the motions affords valuable information as to errors of digestion. One of the most frequent alterations in appearance arises from the presence of *undigested curd*. A small amount of undigested curd is not a serious symptom if the baby is otherwise well and is gaining weight satisfactorily.

If such a condition persists, it is probably due either to too great a quantity being taken or to the milk-mixture being too rich, *i.e.* to over-feeding.

Somewhat more serious is the passage of *green* motions. Greenness of the motions is usually an indication of a too rapid onward movement of the bowel contents. It may be produced in some cases by medicines or powders containing mercury. *Green curdy motions* are especially liable to occur with over-feeding, and are a sign that the undigested food is beginning to set up slight irritation of the bowels.

If this continues or the irritation is excessive from the start, *bright green motions*, possibly also offensive and very frequent, may result.

In such a condition a teaspoonful of castor-oil is required, and water alone may need to be given for a few feeds.

Where such irritation of the bowel is not set up, over-feeding may result in the passage of *large, white, pasty motions*. Where irritation is very great, the motions may become *very frequent and watery*, and may result in an excessive drain of fluid from the system, so that the baby rapidly becomes shrivelled and emaciated. In all severe conditions of diarrhœa medical advice should be obtained at once.

Dryness of the motions usually arises from under-feeding or from the retention of the products of digestion for too long a time in the lower portion of the bowel.

This leads to absorption of too large a quantity of fluid, and results in constipation.

These evil results should be avoided by obtaining a daily action of the bowels.

Offensive motions are the result of fermentation within the bowel, and are usually the result of over-feeding or the taking of tainted or indigestible food.

The motions may be abnormally *pale or even white* from the absence of bile. They become *brownish* in colour when malted or starchy foods are introduced into the food, and when blood is present they may be *red, dark brown, or black* in colour.

REGURGITATION OF FOOD AND VOMITING

The most frequent cause of the bringing up of a little food shortly after feeding is the taking of too much food. It is nature's method of getting rid of the excess. Apart from over-feeding, it may result from unsuitable or too rich food, or from taking food too frequently, too rapidly, or at irregular intervals.

In other cases it may arise from the baby being moved, rocked, or jolted instead of being put to rest at the end of a meal, or from a tight string or band around the abdomen.

If vomiting in greater quantities takes place, medical advice should at once be sought and food either given in smaller quantities, in more digestible form and at longer intervals, or in severe cases withheld altogether.

DIARRHŒA may arise from similar causes, but is especially liable to be brought on by over-feeding or the giving of indigestible food. Contamination and decomposition of the food, however produced, may rapidly give rise to diarrhœa in its severest forms.

Should severe vomiting or diarrhœa come on, all food should be stopped, cold boiled water alone being given, and medical advice should be obtained at once.

COLIC or ABDOMINAL PAIN may occur also in connection with digestive disturbances. If severe,

especially if attended by vomiting, medical advice should be promptly obtained.

During an attack a grain or two of bicarbonate of soda in a teaspoonful of warm dill water may be given at once. The baby should be kept warm and the abdomen gently rubbed with warm olive-oil. It should then be gently held to the nurse in a comfortable, upright position, while its back is tenderly and firmly rubbed.

CONSTIPATION is often the result of under-feeding, however this arises, whether from the mother having too little milk or to too little milk being given, or from the baby being unable to obtain sufficient milk on account of weakness or from obstruction to the nasal passages.

It may be merely a bad habit resulting from the non-enforcement of a daily action of the bowel. It is a condition that should be checked in its earliest stages.

Strong purgatives should be avoided. They are liable to damage the delicate lining membrane of the bowel and to lead to more serious troubles.

If the condition persists, it should be corrected under medical advice.

SKIN AFFECTIONS

NETTLE RASH, URTICARIA, or "HIVES" (red irritable spots) often accompany digestive disturbances and render medical treatment necessary.

ECZEMA may arise from many forms of skin irritation, whether of external or internal origin. The folds of the skin in fat children or where there is much sweating are often thus affected.

SORENESS OF THE BUTTOCKS occurs in connexion with irritation from the urine and stools. The skin may be red and sore only, or may become rough and chafed, cracked or ulcerated. Redness about the orifice of the bowel is often present if an excess of sugar is being taken. In addition to extreme cleanliness and frequent changing of napkins, local applications are often required.

SCURFY PATCHES ON THE HEAD, often with but little redness or irritation, require to be soaked with sweet oil or liquid paraffin, and then gently washed with superfatted soap and warm water.

IMPETIGO (CRUSTED ECZEMA) may affect the skin or the scalp. It is contagious, and requires treatment by removal of the crusts with olive-oil and the subsequent application of an anti-septic ointment.

Careful attention to cleanliness of skin, nails, and scalp is all-important in the prevention of skin affections.

THRUSH

Thrush is a disease of the lining membrane of the mouth, consisting of white patches, due to the implantation of a fungus.

It is often the result of damage to the mucous membrane from the unnecessary cleaning out of the mouth.

It is especially liable to occur in weakly children. Extreme cleanliness with regard to feeding must be observed. Antiseptic treatment is required. A doctor should be consulted.

COLDS AND NASAL CATARRH

Colds and nasal catarrh are often the result of direct infection from others. The catarrh may spread from the throat and nose to the internal ear, often resulting in high fever and severe pain in the ear. This may terminate in discharge from the ear. Prompt medical advice should be obtained in all cases where complications arise in connexion with nasal catarrh.

CROUP OR LARYNGITIS

Croup or laryngitis requires medical attention. Relief may often be obtained by administering a hot bath, by applying a hot linseed poultice to the throat, and by the inhalation of warm, moist air.

ADENOIDS

Adenoids are an increase of the lymphatic tissue which is normally present at the back of the nose.

They may be present at birth in rare cases or may be acquired, usually in connexion with frequent attacks of nasal catarrh, or as a result of the use of a dummy or comforter.

From their interference with nasal breathing they may give rise to serious difficulty in feeding.

From blocking of the nasal passage they are often the cause of extension of nasal catarrh to the internal ear, with the production of deafness or acute disease of the ear.

INFLAMMATION OF THE EYES

If there is any redness, swelling, or discharge about the eyes, immediate medical advice should be obtained. The discharge from an inflamed eye is often highly contagious, and every possible care must be taken to prevent the spread of infection.

JAUNDICE OF THE NEW-BORN

Jaundice is a common symptom in the new-born a few days after birth. It usually passes off in a week or so without any harmful effects.

CONVULSIONS

In convulsions a doctor should be summoned at once. They most often arise in connexion with digestive troubles. They may also occur at the beginning of any acute illness.

Warning symptoms are often given, even for days before the occurrence of convulsions, by the presence of jerking, starting, or twitching movements, when medical advice should be promptly obtained.

A teaspoonful of castor-oil should be given at once, and heat should be applied in the form of a warm bath (102° F.). After a few minutes the baby should be rapidly dried and wrapped in a soft, warm blanket. Heat may also be applied in the form of hot fomentations to the abdomen, or, if skilled attendance is to hand, by the administration of a hot saline enema of 2 or 3 oz. at a temperature of 105° F.

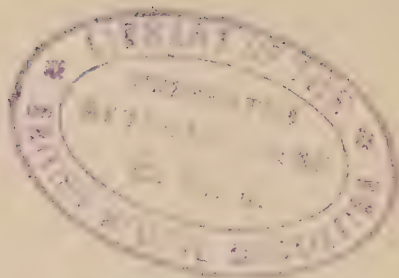
BURNS AND SCALDS

Small burns and scalds should be covered as soon as possible with clean linen soaked in carron oil (equal parts of lime-water and linseed oil), liquid paraffin, or olive-oil, or spread with vaseline.

Large burns are dangerous from the pain and shock produced. A doctor must be sent for. The burns themselves should be covered in the same way as above, with as little exposure and exhaustion of the baby as possible. It should then be placed in a warm bed and the heat maintained with carefully protected hot bottles.

CHOKING

Holding the baby with its head forwards, it is usually easy to remove the half-swallowed substance with the forefinger. If this cannot be done, the baby should be laid on its stomach with its head low, or may even be held up by the feet and then patted smartly on the back, while the attempt to remove the substance is again made.



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